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A new species of *Androctonus* Ehrenberg, 1828 from the Aïr Massif in Niger (Scorpiones: Buthidae)

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Abstract

A new species of scorpion belonging to the genus *Androctonus* Ehrenberg, 1828 (Family Buthidae C.L. Koch, 1837) is described on the basis of one male specimen collected in the Aïr Massif in Niger. This population was previously associated with *Androctonus hoggarensis* (Pallary, 1929), originally described from the Hoggar Mountains in Algeria. A more precise analysis of several morphological characters from these rare *Androctonus* populations, attests for some important differences between the two species. As in previous studied cases, these Saharan Massifs prove to be very important endemic centres within the Sahara desert.

Keywords: Scorpion, *Androctonus*, new species, Saharan Massifs, Aïr, Niger.

Introduction

As already pointed out in several previous papers (Lourenço, 2005, 2008; Lourenço *et al.*, 2009, 2012) the taxonomy of the genus *Androctonus* Ehrenberg, 1828 has long remained complex and confused. In his contributions to the study of North African scorpions, Vachon (1948, 1952) attempted to establish a better definition of the genus *Androctonus* and its species. His results, however, remained unsatisfactory. Only more than half century later, Lourenço (2005) attempted again to characterize the distinct populations of *Androctonus*. A few species have been synonymised, some subspecies were raised to the rank of species and two new species were described. After the publication of this preliminary clarification on the taxonomy of *Androctonus*, more new species have been added to the genus (e.g. Lourenço, 2008; Lourenço & Qi, 2006, 2007; Lourenço *et al.*, 2009, 2012).

Among the *Androctonus* species some apparently remain rare and are still poorly studied. This is the case of *Androctonus hoggarensis* (Pallary, 1929) species described from In Ameri and In Fergane in the Hoggar Mountains in Algeria. As it was the case

with most descriptions proposed by Pallary, types of this species were not clearly designated. Consequently, it is almost certain that these are lost or at least mislead.

In the synthesis of his studies about the scorpions of North Africa, Vachon (1952) confirmed the distribution of *A. hoggarensis* for three Saharan Mountain ranges Hoggar and Tassili N'Ajjer in Algeria and Aïr in Niger (Figs. 1-2). Nevertheless, Vachon (1952) stated that this species could present a certain degree of variability and suggested that the study of more specimens could lead to its division in several forms. He called the attention in particular to the population distributed in the Aïr Massif, which differed by a smaller size and a distinct pattern of pigmentation. In a parallel study to that of the North African scorpion fauna, Vachon (1950) produced, more or less, a listing of several Arachnida collected in the Aïr Mountains, including a number of scorpions which he identified as: *Androctonus hoggarensis* (Pallary, 1929), *Androctonus amoreuxi* (Audouin, 1826), *Leiurus quinquestriatus* (Ehrenberg, 1828) and *Compsobuthus werneri* (Birula, 1908). The specimens from Aïr have been collected by L. Chopard and A. Villiers of the 'Institut français d'Afrique Noire' (IFAN), located in Dakar, Senegal, and it is noticeable that Vachon (1952) largely based the illustrations of *A. hoggarensis* on the only adult male collected in the Aïr Massif (see figures 192 to 197). By proceeding this way, Vachon (1952) mixed up the characters of the two populations from Aïr and Hoggar.

Specimens of *A. hoggarensis* from both the Hoggar and Tassili N'Ajjer Mountains are deposited in the collections of the Muséum in Paris, however, none of the specimens studied by Vachon (1950) from the Aïr Mountains is now available. In fact these specimens remained in the collection of IFAN, as cited by Vachon (1952: 155).

The Aïr Massif remains a very inaccessible region and new collections in the area are rare. Some time ago, I received from Mr. Sébastien Sant of Nice in France, a male specimen of *Androctonus* which I first associated to *A. hoggarensis*. More detailed comparative studies including specimens of *A. hoggarensis* from Hoggar and Tassili N'Ajjer confirmed the existence of several distinct characters, as already suggested by Vachon (1952). Therefore the population inhabiting the Aïr Mountains and previously identified as *A. hoggarensis* is now described as a new species.

Material and Methods

Illustrations and measurements were made with the aid of a Wild M5 stereo-microscope with a drawing tube (camera lucida) and an ocular micrometer. Measurements follow Stahnke (1970) and are given in mm. Trichobothrial notations are after Vachon (1974) and morphological terminology mostly follow Vachon (1952) and Hjelle (1990).

Comparative material of *Androctonus hoggarensis* are also examined for this study: Algeria, Hoggar Mountains, Tamanrasset, under rocks, 3-4/II/1956 (M. Gast), 1 male and 1 female (MNHN-RS-3045); Algeria, Tassili N'Ajjer, 24/I/1963 (H. Lhote), 3 males (MNHN-RS-3947).

Taxonomic treatment

Family Buthidae C.L. Koch, 1837
Genus *Androctonus* Ehrenberg, 1828

Androctonus santi sp. n. (Figs. 3, 6-13)

Niger, Aïr Massif, Bagzane Mountains, Zabou Rift (17°40.083'N – 8°39.809'E), 24/XI/2006 (S. Sant), Holotype, pre-adult male. Deposited in the Muséum national d'Histoire naturelle, Paris (MNHN).

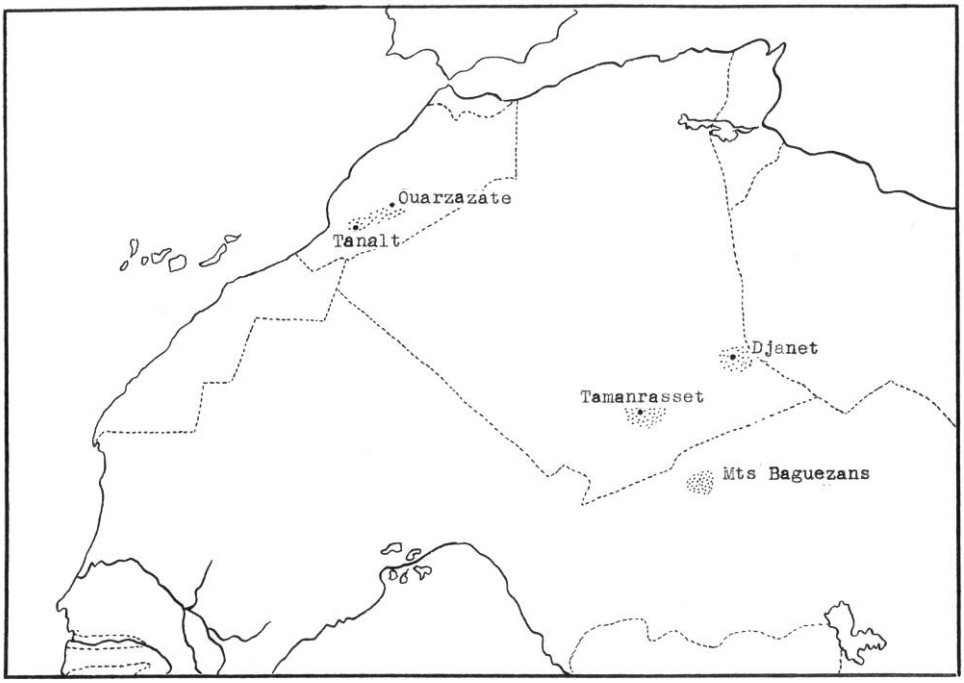


Fig. 1. Map of Western North Africa presented by Vachon (1952), with the suggested distribution of *Androctonus hoggarensis*: Tamanrasset, Djanet and Mts. Baguezans. The area of distribution indicated in Morocco refers to *Androctonus sergenti* Vachon, 1948.

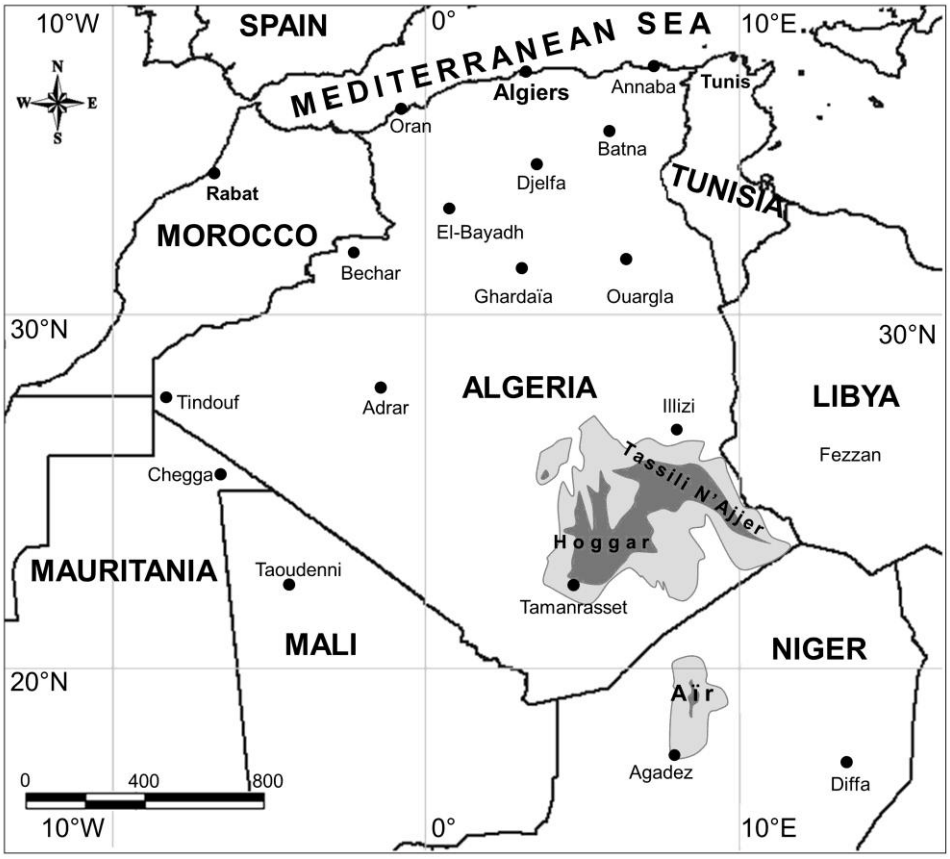


Fig. 2. Map of Western North Africa with the precise locations of Hoggar, Tassili N'Ajjer and Aïr Massifs.

Etymology: The specific name honours Mr. Sébastian Sant, Nice, France, who collected the specimen here described.

Diagnosis

A scorpion of medium size, with pre-adult male reaching a total length of 58.5 mm (full adults should reach 65 to 70 mm in total length). General colouration dark brown to blackish; legs dark brown; metasomal carinae almost blackish. Carinae and granulations on carapace and tergites moderately developed. Metasomal segments I to V only moderately enlarged distally; dorsal depression on segments I to IV moderately to strongly marked. Anal arc with four moderately marked rounded lobes. Pedipalps with an inconspicuous setation on femur and patella; fixed and movable fingers with 12-12 rows of granules. Pectines with 32-32 teeth in the male holotype.

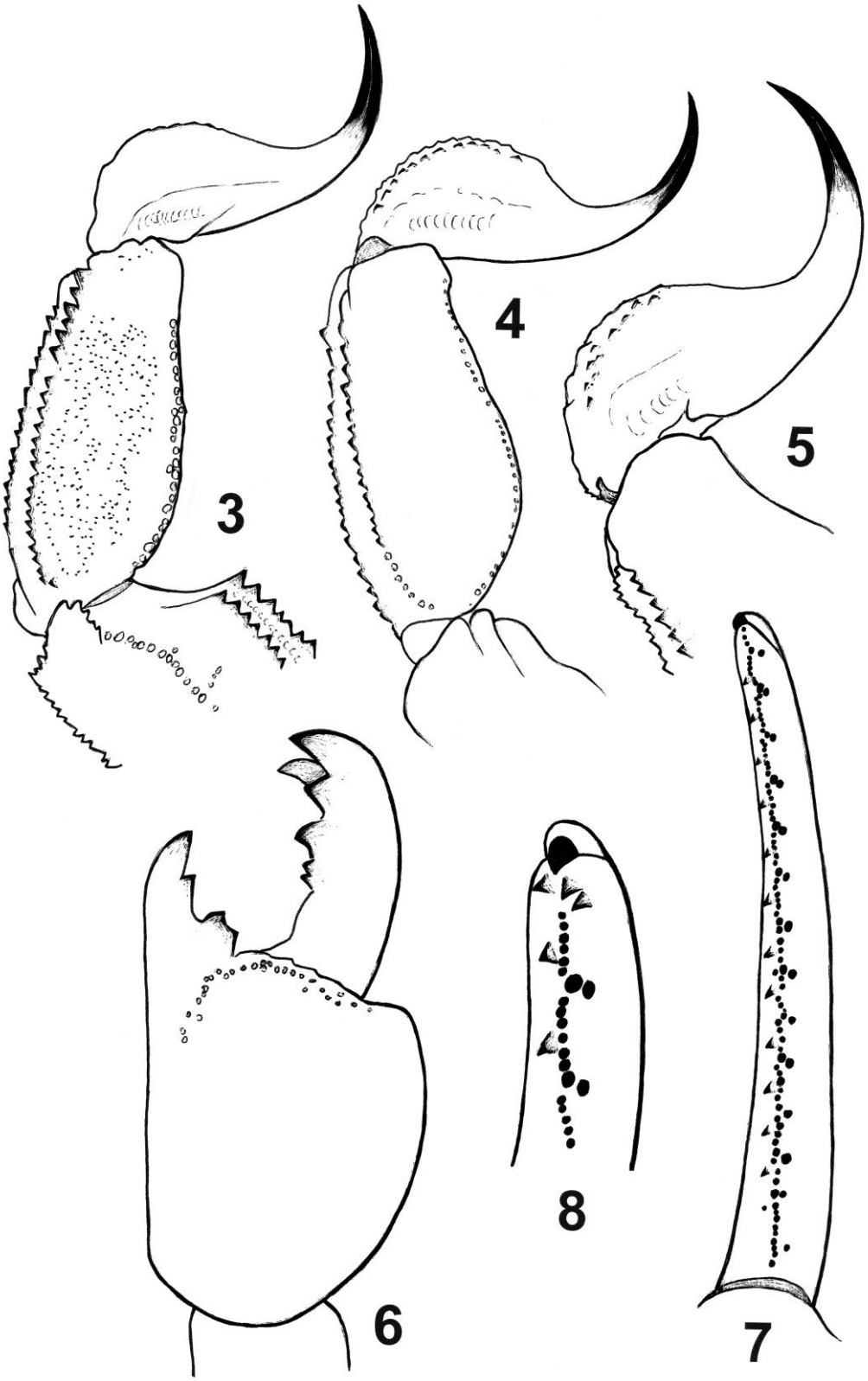
Relationships

Androctonus santi sp. n., can be distinguished from the other species of *Androctonus*, and in particular from *Androctonus hoggarensis* (Pallary, 1929), by a number of characters: (i) colouration of legs dark brown; not yellow, (ii) a smaller overall size, (iii) metasomal segment V intensely granulated and with better marked anal lobes, (iv) chela fingers with 12-12 rows of granules, vs. 13-14 in *A. hoggarensis*, (v) scalloping of the proximal dentate margin of the fixed finger better marked on the new species, as suggested on the drawings presented by Vachon (1952).

Description based on male holotype. [Measurements in Table (I).]

Colouration. Mainly dark-brown to blackish. Prosoma: carapace dark brown with an inverted blackish triangle extending from the lateral eyes to the median eyes; carinae and eyes marked by dark pigment. Mesosoma: dark brown. Metasoma: segments I to V dark brown to blackish; carinae blackish; vesicle dark brown; aculeus reddish at its base and blackish at its extremity. Venter yellow to brown-yellow; pectines and genital operculum pale yellow; sternites III to VI, in male, with large white spots. Chelicerae brownish-yellow with intense dark variegated spots; fingers brownish with dark teeth. Pedipalps dark brown to blackish with very dark carinae; fingers brownish-yellow with the oblique rows of granules dark red. Legs dark brown.

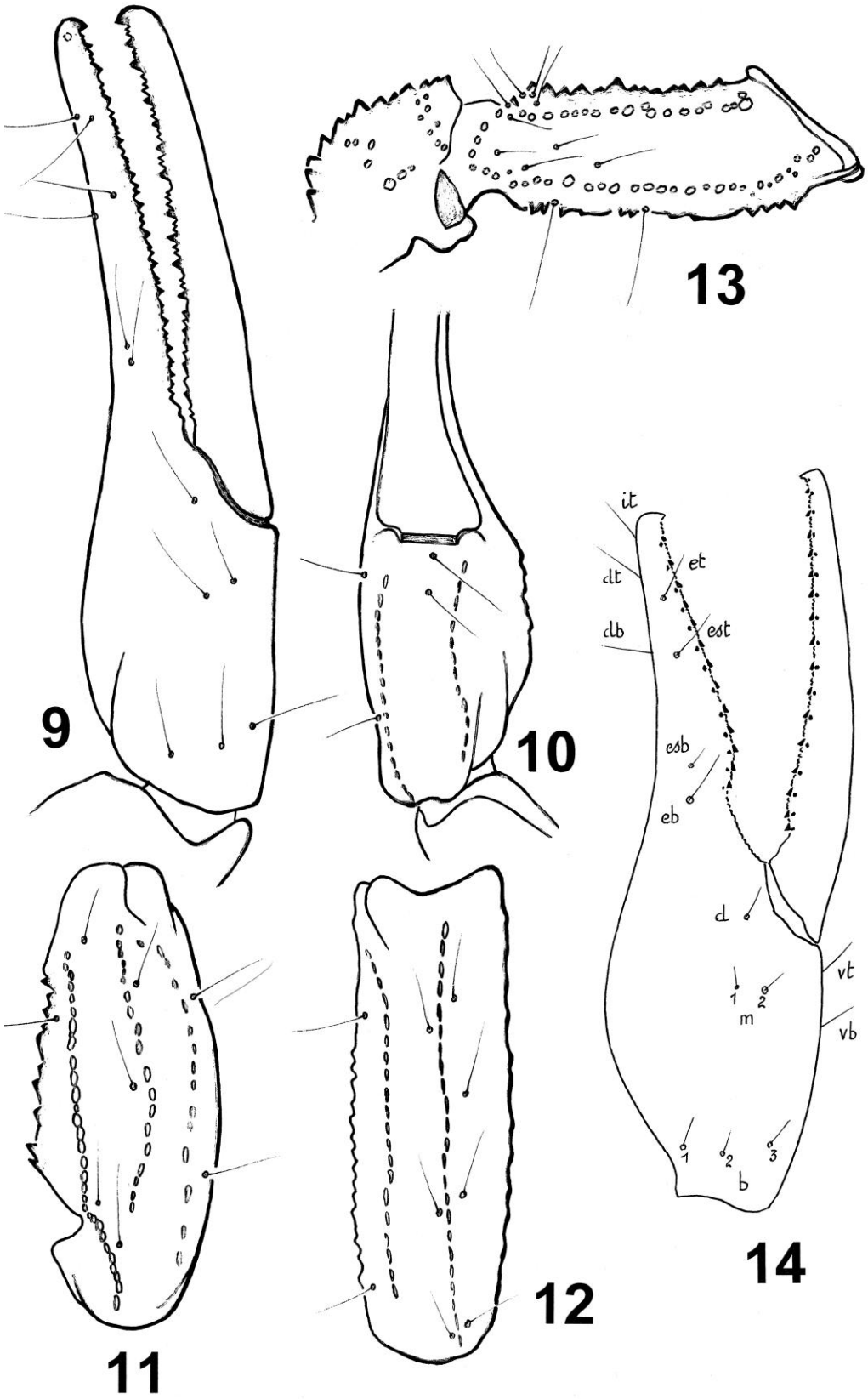
Morphology. Carapace moderately granular; anterior margin without any median concavity, straight. Carinae moderately marked; anterior median, central median and posterior median carinae moderately granular. All furrows moderate to weak. Median ocular tubercle slightly anterior to the centre of carapace. Eyes separated by more than two ocular diameters. Three pairs of lateral eyes. Sternum triangular and narrow; slightly longer than wide. Mesosoma: tergites moderately to strongly granular. Three longitudinal carinae moderately to strongly crenulate in all tergites; lateral carinae reduced in tergites I and II. Tergite VII pentacarinate. Venter: genital operculum divided longitudinally, forming two semi-oval plates. Pectines: pectinal tooth count 32-32 in male holotype; middle basal lamella of the pectines not dilated. Sternites without granules, smooth with elongated spiracles; four moderately to strongly marked carinae on sternite VII; other sternites acarinate and with two vestigial furrows. Metasoma: segments I with 10 carinae, strongly crenulated; ventral strongly marked; segments II to IV with 8 carinae, crenulated; the first four segments with a smooth and moderately to strongly marked dorsal depression; segment V with five carinae; the latero-ventral carinae crenulate with several lobate denticles; ventral median carina not divided posteriorly; anal arc composed of 17-18 inconspicuous ventral teeth, and four moderately marked rounded lateral lobes.



Figs. 3-8. *Androctonus santi* sp. n. (3, 6-8) and *Androctonus hoggarensis* (4-5). 3-5, Metasomal segment V and telson. 3. Male holotype of *A. santi* sp. n. 4-5. Pre-adult and adult males of *A. hoggarensis*. 6. Chelicera, dorsal aspect. 7. Cutting edge of fixed finger. 8. Extremity of movable finger.

Table I. Morphometric values (in mm) of the pre-adult male holotype of *Androctonus santi* sp. n. and of a pre-adult male of *Androctonus hoggarensis* from Hoggar Mountains.

	A. santi sp. n. ♂ holotype	*A. hoggarensis* ♂ from Hoggar
Total length (telson included)	58.5	61.9
Carapace:		
-length	7.6	7.4
-anterior width	5.2	5.2
-posterior width	8.8	8.3
Mesosoma length	13.0	15.2
Metasomal segment I:		
-length	4.8	5.1
-width	4.8	4.7
Metasomal segment II:		
-length	5.5	5.8
-width	4.9	4.5
Metasomal segment III:		
-length	5.7	6.1
-width	5.0	4.5
Metasomal segment IV:		
-length	7.1	7.4
-width	4.7	4.4
Metasomal segment V:		
-length	7.9	8.0
-width	4.5	4.2
-depth	4.0	4.0
Telson length	6.9	6.9
Vesicle:		
-width	3.2	3.2
-depth	2.5	2.6
Pedipalp:		
-Femur length	6.5	6.8
-Femur width	2.2	2.2
-Patella length	7.5	8.0
-Patella width	2.8	3.0
-Chela length	12.9	13.0
-Chela width	2.7	2.7
-Chela depth	2.7	2.8
Movable finger: length	8.5	8.8



Figs. 9-13. *Androctonus santi* sp. n. Male holotype. Trichobothrial pattern. 9-10. Chela dorso-external and ventral aspects. 11-12. Patella, dorsal and external aspects. 13. Femur, dorsal aspect. 14. Chela of *A. hoggarensis* (= *A. santi* sp. n.), male from Aïr, as illustrated by Vachon (1952: fig. 195).

Intercarinal spaces moderately granular. Telson with some weak granulations on ventral surface; other surfaces smooth; aculeus moderately curved and with almost the same length as the vesicle; subaculear tooth absent. Cheliceral dentition as defined by Vachon (1963) for the family Buthidae; external distal and internal distal teeth approximately the same length; basal teeth on movable finger small but well-marked and not fused; ventral aspect of both fingers and manus covered with long dense setae. Pedipalps: femur pentacarinate; patella with nine carinae; chela with only vestigial carinae; all faces weakly granular to smooth; femur and patella with an inconspicuous setation. Fixed and movable fingers with 12-12 oblique rows of granules. Internal and external accessory granules present; internal more strongly marked; three accessory granules on the distal end of the movable finger next to the terminal denticle. Legs: tarsus with numerous thin setae ventrally; tibial spur strong on legs III and IV; pedal spurs moderate to strong on legs I to IV. Trichobothriotaxy: trichobothrial pattern of Type A, orthobothriotaxic as defined by Vachon (1974). Dorsal trichobothria of femur arranged in Beta-**β**-configuration (Vachon, 1975).

Biogeographic comments

As previously discussed in several publications (e.g. Lourenço & Leguin, 2014; Lourenço *et al.*, 2012) several species of the Saharan realm are present only in refuge zones. These zones may be represented by oases, but in most cases correspond with the Saharan massifs, such as Hoggar, Tassili N'Ajjer, Aïr, Adrar, Tibesti, Ennedi and Kapka. These areas have attracted the attention of naturalists since the middle of the 20th century, and a number of works on scorpions have been published (e.g. Vachon, 1950, 1958). Most of these preliminary results, however, proved unsatisfactory since most local elements in these massifs were simply associated with species known from other areas. More recent studies demonstrate that many of these local populations do correspond with endemic species (e.g. Lourenço, 1999, 2002, 2008; Lourenço & Leguin, 2014; Lourenço *et al.*, 2012, Lourenço & Rossi, 2015). With the descriptions of a further new species, the Saharan Massifs confirm their importance as very important endemic centres within the Sahara desert.

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I am most grateful to Dr. H.K. El-Hennawy, Cairo, Egypt, for his kind invitation to contribute a paper to *SERKET*, and to Mr. Salah Eddine Sadine, Université de Ghardaïa, Algeria, for assistance in the preparation of figure 2.

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***Androctonus santi* Lourenço, 2015**
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A contribution to the spider fauna of the European part of Turkey (Araneae)

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Abstract

This paper reports ten species for the first time from the European part of Turkey: *Anagraphis ochracea* (L. Koch, 1867) (F. Gnaphosidae), *Centromerus valkanovi* Deltshev, 1983 (F. Linyphiidae), *Harpactea clementi* Bosmans, 2009 and *Harpactea strandjica* Dimitrov, 1997 (F. Dysderidae), *Inermocoelotes karlinskii* (Kulczyński, 1906) and *Textrix chyzeri* de Blauwe, 1980 (F. Agelenidae), *Ozyptila confluens* (C.L. Koch, 1845) (F. Thomisidae), *Piratula knorri* (Scopoli, 1763) (F. Lycosidae), *Pseudeuophrys vafra* (Blackwall, 1867) (F. Salticidae), and *Titanoeca quadriguttata* (Hahn, 1833) (F. Titanoecidae). All species except the last one, *T. quadriguttata*, are new to the Turkish araneofauna. Their morphology is briefly described and illustrated.

Keywords: Spiders, Araneae, Marmara Region, new records, Thrace, Turkey.

Introduction

Faunistic research on European spiders of Turkey is relatively poor. So far, studies have been limited to a certain area and they are extremely inadequate. This study is the most comprehensive study carried out in the European part of Turkey. Recently, Helsdingen (2013) had contributed to spider fauna of European Turkey. The number of species known from the European part of Turkey according to checklist of Turkish spiders published by Topçu *et al.* (2005) was 144 and Helsdingen (2013) raised it to 197.

In this study, ten species are recorded from the European part of Turkey for the first time: *Anagraphis ochracea* (L. Koch, 1867) (F. Gnaphosidae), *Centromerus valkanovi* Deltshev, 1983 (F. Linyphiidae), *Harpactea clementi* Bosmans, 2009 and *Harpactea strandjica* Dimitrov, 1997 (F. Dysderidae), *Inermocoelotes karlinskii* (Kulczyński, 1906) (F. Agelenidae), *Ozyptila confluens* (C.L. Koch, 1845) (F. Thomisidae), *Piratula knorri* (Scopoli, 1763) (F. Lycosidae), *Pseudeuophrys vafra* (Blackwall, 1867) (F. Salticidae), *Textrix chyzeri* de Blauwe, 1980 (F. Agelenidae),

and *Titanoeca quadriguttata* (Hahn, 1833) (F. Titanoecidae). Specimens were compared with two checklists of spiders of Turkey (Bayram *et al.*, 2014; Topçu *et al.*, 2005). All species except the last one, *T. quadriguttata*, are new to the Turkish araneofauna. As a result of this study, we add new contribution to the spider fauna of Turkey and the European part of Turkey.

Material and Methods

Specimens were collected from different localities of European part of Turkey and preserved in 70% ethanol. All illustrations were made by an Olympus SZX16 stereomicroscope. The material is deposited in the Arachnology Museum of Niğde University (NUAM). All measurements are in millimetres. World distribution of all species follows World Spider Catalog (2015).

Results

Anagraphis ochracea (L. Koch, 1867)
Material examined: 1♀, Tekirdağ province, Barış & Özgürlük Park (40°98'035"N, 27°52'804"E), 25.05.2014.
Description: (Fig. 1) Female: Body length 5.2 mm. Prosoma yellow. Opisthosoma whitish yellow, oval. Epigyne with U-shaped median depression. Vulvae with globular receptacles.
World distribution: Albania, Macedonia, Greece.

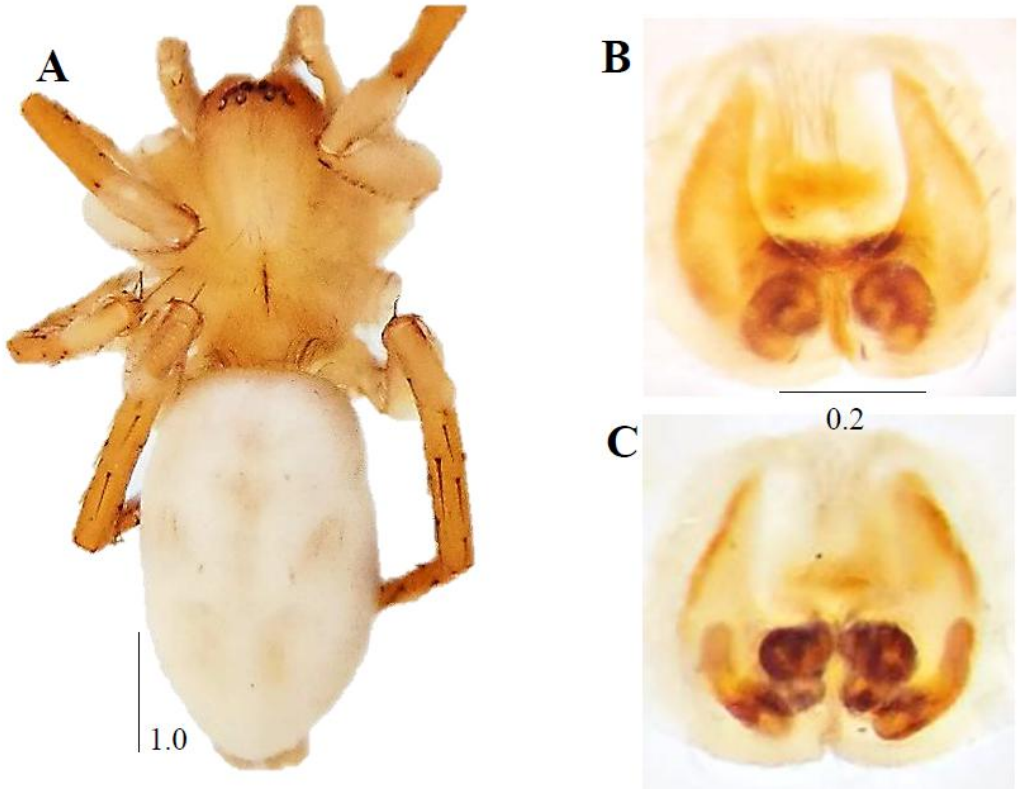


Fig. 1. *Anagraphis ochracea* (L. Koch, 1867) ♀. A. Habitus, dorsal view B. Epigyne, ventral view C. Vulvae, dorsal view.

Centromerus valkanovi Deltshev, 1983
Material examined: 1♀, İstanbul province, Beşiktaş district, Yıldız Park (41°04'900"N, 29°01'548"E), 06.04.2015.
Description: (Fig. 2) Female: Body length 1.8 mm. Prosoma yellow. Legs pale yellow with spines. Opisthosoma brown. Epigyne with broad scapus and proximal part of scapus with two swollen extensions.
World distribution: Bulgaria.

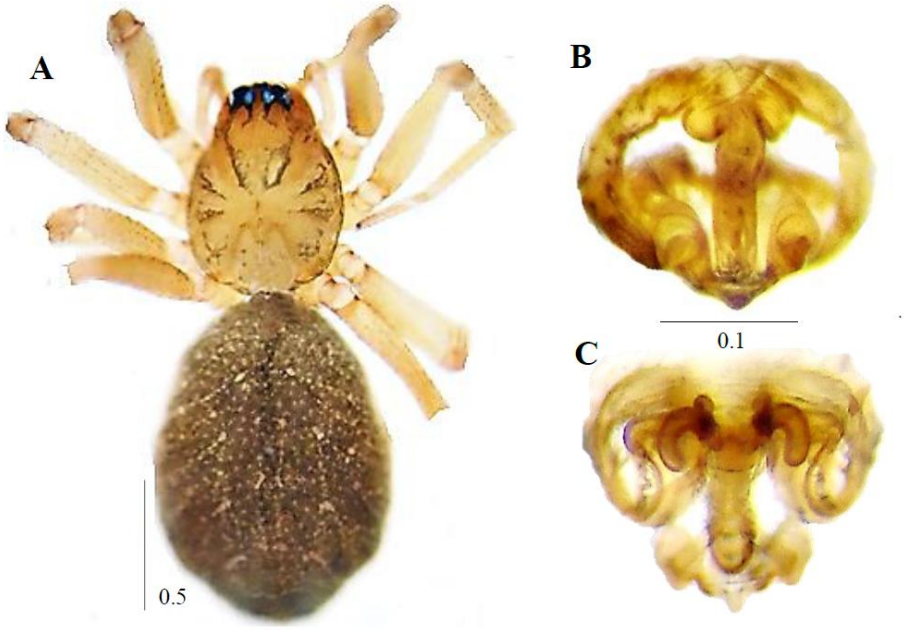


Fig. 2. *Centromerus valkanovi* Deltshev, 1983 ♀. A. Habitus, dorsal view B. Epigyne, ventral view C. Vulvae, dorsal view.

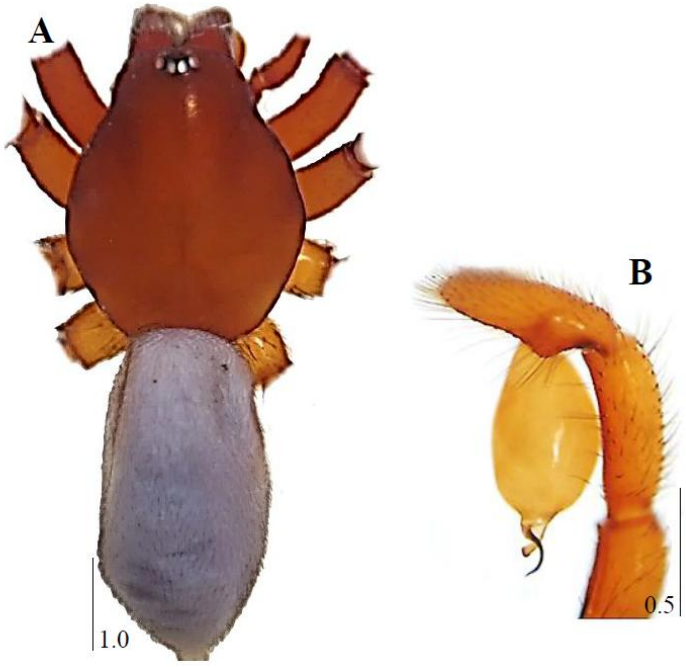


Fig. 3. *Harpactea clementi* Bosmans, 2009 ♂. A. Habitus, dorsal view B. Pedipalp, lateral view.

Harpactea clementi Bosmans, 2009
Material examined: 1♂, İstanbul province, Fatih district, Yedikule Dungeons (40°99'512"N, 28°92'135"E), 17.05.2015.
Description: (Fig. 3) Male: Body length 6.7 mm. Prosoma reddish brown. Legs brown. Opisthosoma whitish grey and fine hairy. Pedipalp with slender, hook shaped embolus.
World distribution: Greece.

Harpactea strandjica Dimitrov, 1997
Material examined: 1♀, Tekirdağ province, Saray district, Bahçeköy village, Ceneviz Cave (41°29'845"N, 27°55'062"E), 23.09.2014.
Description: (Fig. 4) Female: Body length 6.7 mm. Prosoma reddish brown. Legs orange-brown. Opisthosoma whitish grey with fine hairy. Vulvae with wide, sclerotized posterior part and a reverse T-shaped spermatheca at the anterior part.
World distribution: Bulgaria.

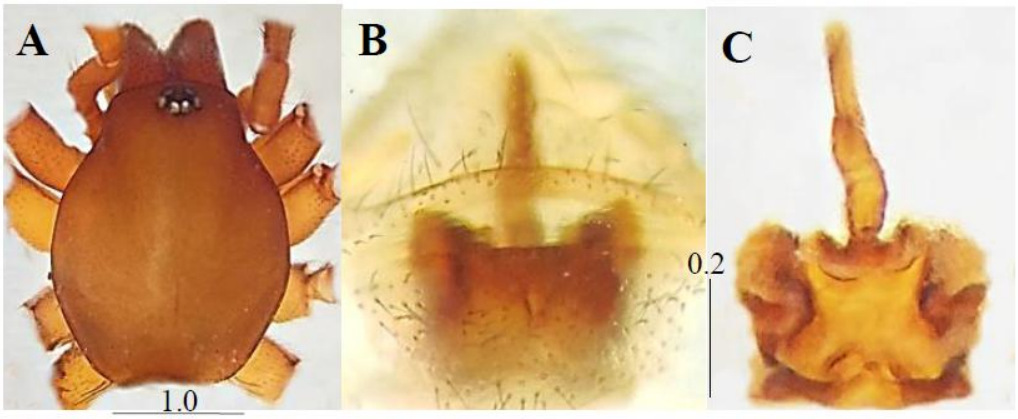


Fig. 4. *Harpactea strandjica* Dimitrov, 1997 ♀. A. Prosoma, dorsal view B. Epigyne, ventral view C. Vulvae, dorsal view.

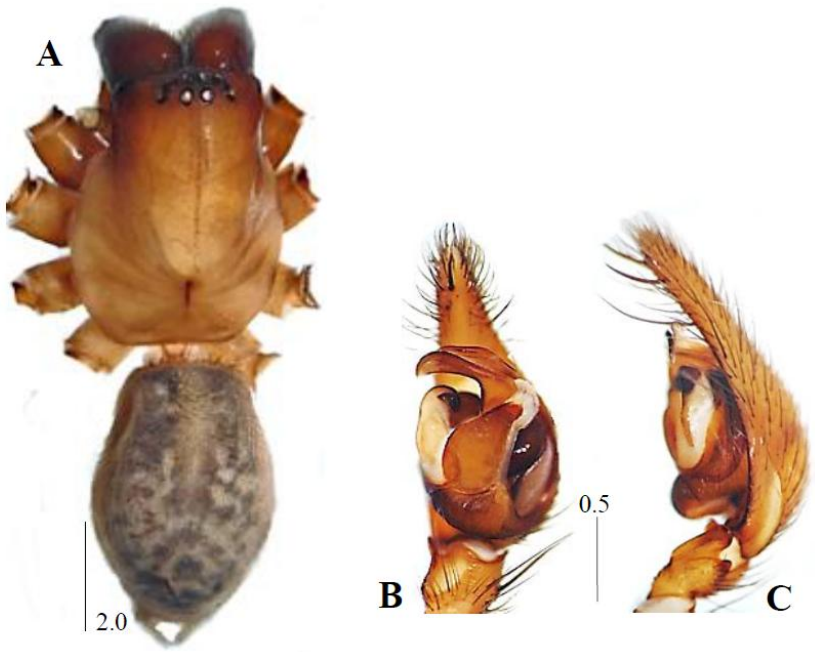


Fig. 5. *Inermocoelotes karlinskii* (Kulczyński, 1906) ♂. A. Habitus, dorsal view B. Pedipalp, ventral view C. Pedipalp, lateral view.

Inermocoelotes karlinskii (Kulczyński, 1906)
Material examined: 1♂, Kırklareli province, Vize district, Kışlacık village, Kovantaşı Cave (41°42'349"N, 27°54'683"E), 25.09.2014.
Description: (Fig. 5) Male: Body length 11.0 mm. Prosoma yellowish brown. Opisthosoma grey with yellowish pattern. Pedipalp with a conductor at a right angle.
World distribution: Southeastern Europe.

Ozyptila confluens (C.L. Koch, 1845)
Material examined: 1♂, Tekirdağ province, Şarköy district, İğdebağları village (40°65'007"N, 27°14'540"E), 04.09.2014; 1♂, Kırklareli province, Demirköy district, İğneada Longoz Forests National Park (41°87'703"N, 27°98'148"E), 13.09.2014; 1♀, İstanbul province, Beşiktaş district, Yıldız Park (41°04'900"N, 29°01'548"E), 04.05.2015.
Description: (Fig. 6) Female: Body length 5.5 mm. Prosoma reddish brown with lighter median band. Opisthosoma dark brown with whitish brown patterns. Epigyne with a broad median septum. Male: Body length 3.0 mm. Similar to female habitus. Pedipalp with a stubby ventral apophysis, a slender retrolateral apophysis and a horn-shaped lateral apophysis.
World distribution: Southern Europe, Syria.

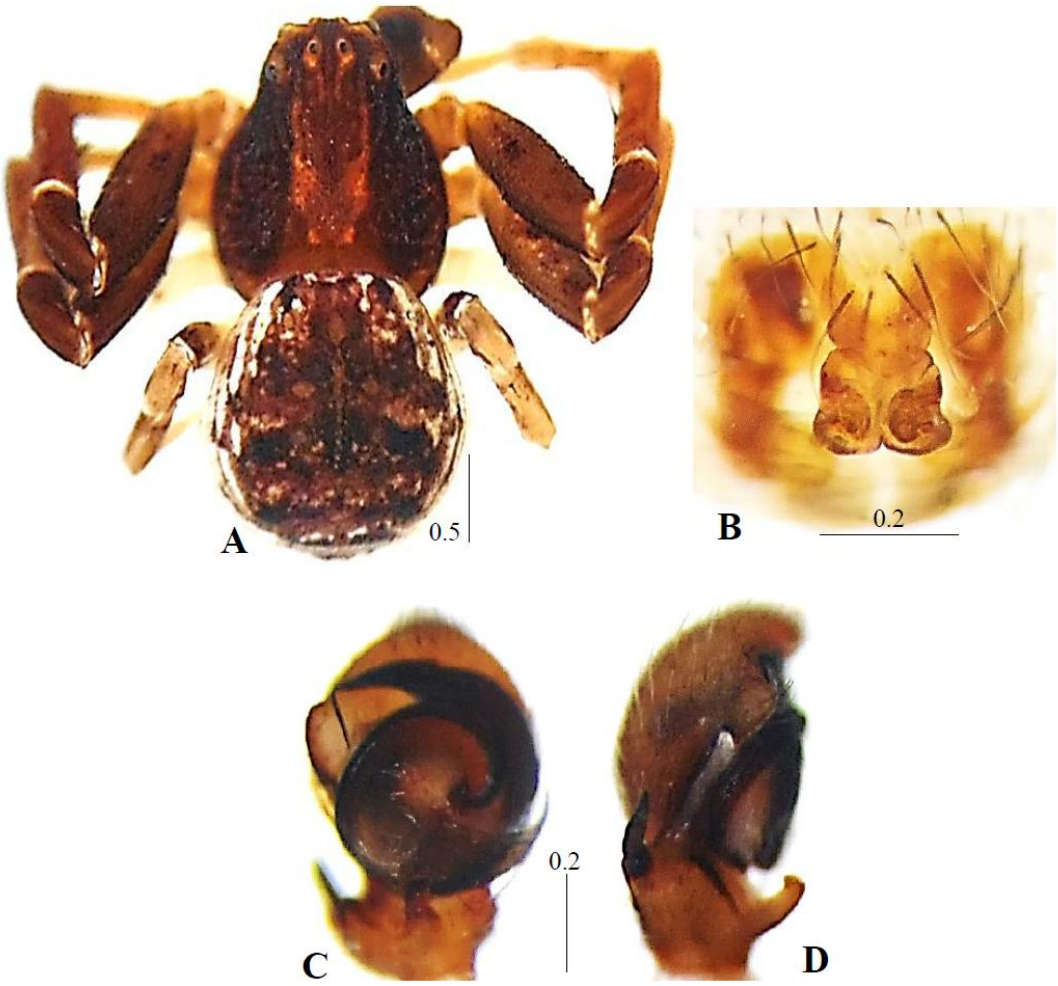


Fig. 6. *Ozyptila confluens* (C.L. Koch, 1845) ♀, ♂. A. Male, habitus, dorsal view. B. Epigyne, ventral view. C. Pedipalp, ventral view. D. Pedipalp, lateral view.

Piratula knorri (Scopoli, 1763)
Material examined: 7♀, Kırklareli province, Vize district, Hamidiye village, near the Kurudere Cave (41°38'948"N, 27°58'463"E), 26.05.2015.
Description: (Fig. 7) Female: Body length 7.4 mm. Prosoma dark brown with a fork-shaped bright median band. Legs brown with light annulations. Opisthosoma dark brown with bright anterior median band. Epigyne simple with small upper spermathecae.
World distribution: Europe.

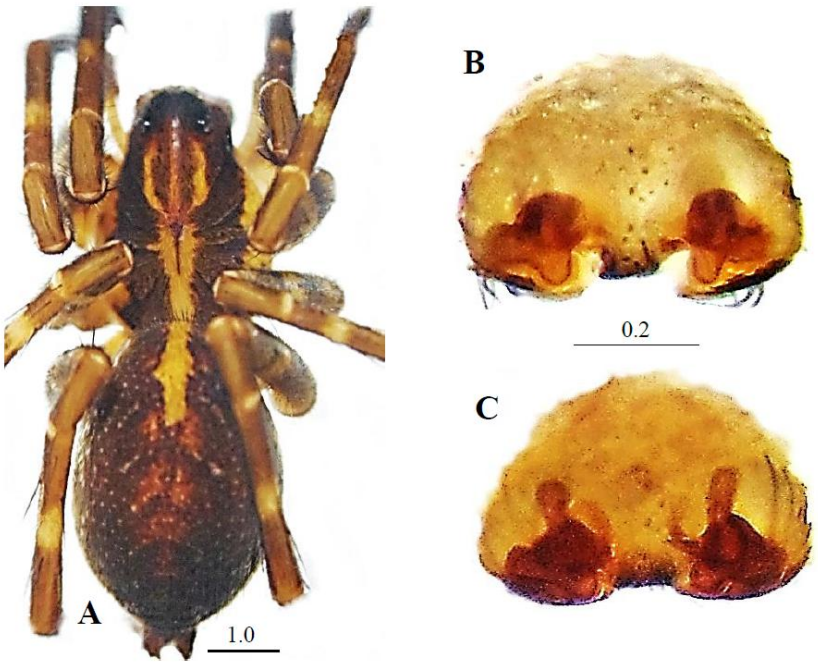


Fig. 7. *Piratula knorri* (Scopoli, 1763) ♀. A. Habitus, dorsal view. B. Epigyne, ventral view. C. Vulvae, dorsal view.

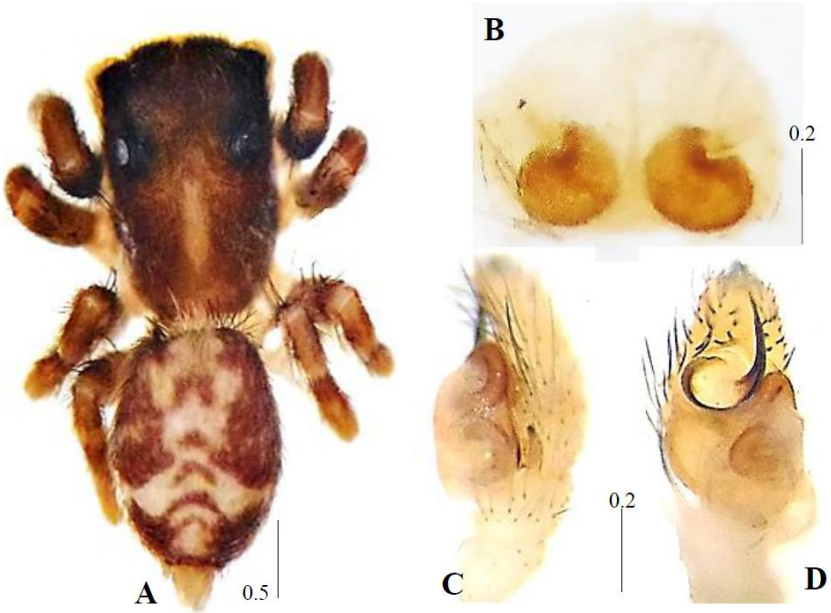


Fig. 8. *Pseudeuophrys vafra* (Blackwall, 1867) ♀, ♂. A. Male, habitus, dorsal view. B. Vulvae, dorsal view. C. Pedipalp, lateral view. D. Pedipalp, ventral view.

Pseudeuophrys vafra (Blackwall, 1867)
Material examined: 3♀, İstanbul province, Fatih district, Yedikule Dungeons (41°04'900"N, 29°01'548"E), 02.04.2014; 8♀, 6♂, İstanbul province, Beşiktaş district, Yıldız Park (41°04'900"N, 29°01'548"E), 24.05.2014; 3♀, 3♂, İstanbul province, Beşiktaş district, Yıldız Park (41°04'900"N, 29°01'548"E), 06.04.2015.
Description: (Fig. 8) Female: Body length 5.0 mm. Prosoma dark brown with a whitish median band. Legs yellowish brown. Opisthosoma greyish brown with a white median band that widen rearwards. Epigyne simple with thin median septum. Vulvae with large, bean-shaped spermathecae. Male: Body length 3.5 mm. Similar to female habitus. Pedipalp with short, black pointed tibial apophysis.
World distribution: Azores, Madeira, Mediterranean.

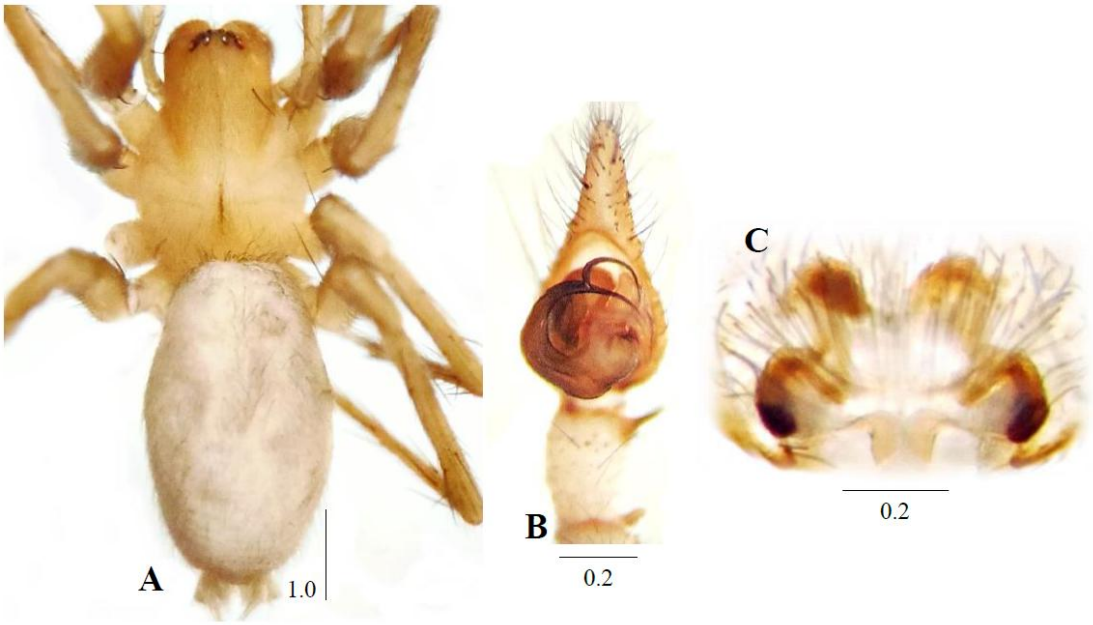


Fig. 9. *Textrix chyzeri* de Blauwe, 1980 ♀, ♂. A. Female, habitus, dorsal view. B. Pedipalp, ventral view. C. Epigyne, ventral view.

Textrix chyzeri de Blauwe, 1980
Material examined: 6♀, 4♂, Kırklareli province, Vize district, Balkaya village, Uzuntarla (Domuzdere) Cave, (41°34'828"N, 27°57'281"E), 24.09.2014.
Description: (Fig. 9) Female: Body length 6.5 mm. Prosoma yellowish brown. Opisthosoma greyish white with dense fine hairs. Epigyne with short septum. Male: Body length 5.0 mm. Similar to female habitus. Pedipalp with short tibial apophysis and forked bulb apophysis.
World distribution: Eastern Europe.

Titanoeca quadriguttata (Hahn, 1833)
Material examined: Edirne province, Keşan district, Kocadere pond (40°86'627"N, 26°64'380"E), 19.05.2014; 1♀, Çanakkale province, Gökçeada district, Aydıncık, (40°11'241"N, 25°52'815"E), 31.05.2015; 1♀, Çanakkale province, Gökçeada district, Tepeköy village, (40°10'262"N, 25°45'642"E), 31.05.2015.
Description: (Fig. 10) Female: Body length 5.0 mm. Prosoma and legs brown. Opisthosoma dark brown. Vulvae with two long spermathecae.
World distribution: Palaearctic.

[*Titanoeca quadriguttata* was recently recorded from Gebere dam, Melendiz Mountains in the province of Niğde by Demir *et al.* (2015).]

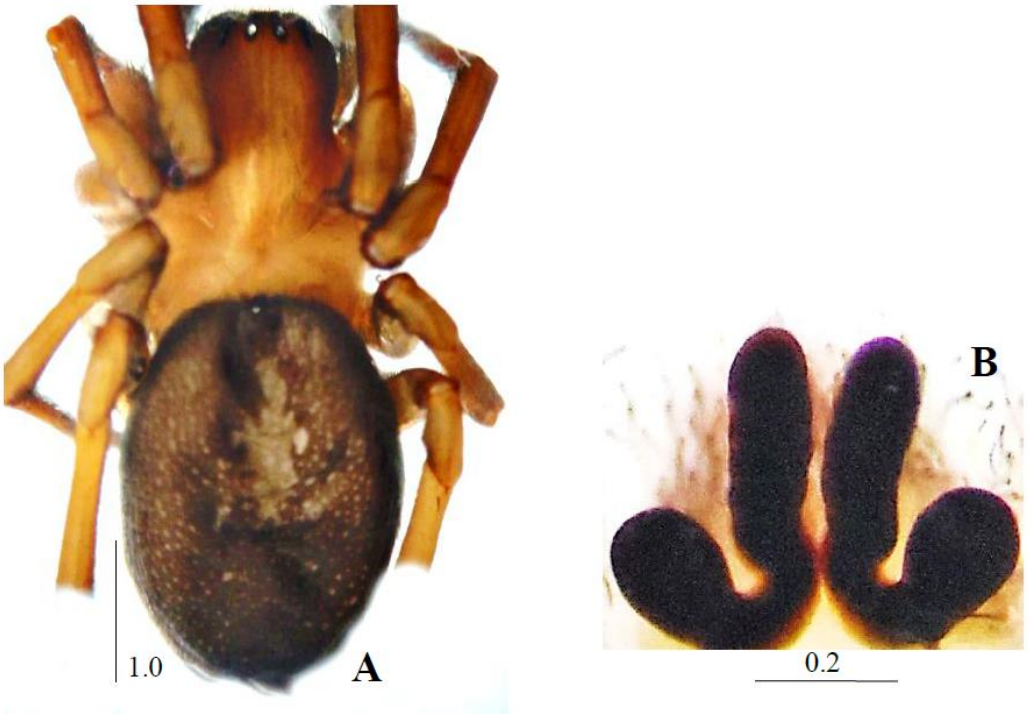


Fig. 10. *Titanoeca quadriguttata* (Hahn, 1833) ♀. A. Habitus, dorsal view. B. Vulvae, dorsal view.

Acknowledgments

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Serket (2015) vol. 14(4): 184-188.

A new species of the genus *Enoplognatha* Pavesi, 1880 (Araneae: Theridiidae) from Iraq

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Abstract

Enoplognatha iraqi sp. n. is described and illustrated from Iraq. Pictures of the male palp and female epigyne are presented with a description of the new species. Differences between the new species and related species are discussed.

Keywords: Araneae, Theridiidae, *Enoplognatha*, new species, Basrah, Iraq.

Introduction

The spider fauna of Iraq is poorly studied, and arachnological investigations are still poor (Ahmed & Ahmed, 2013). The spider family Theridiidae, also known as cobweb or comb-footed spiders, is one of the most species-rich families of spiders, with 2461 species in 122 genera (World Spider Catalog, 2015). Only one record of this family is known in Iraq. Bosmans & Van Keer (1999) recorded *Enoplognatha franzi* Wunderlich, 1995 from Amara, Iraq.

Theridiid spiders, including genus *Enoplognatha*, have great variation in shape and colouration, the majority has an abdominal pattern, but some are uniformly greyish or black. Here, a new species of this genus is described from Basrah, Iraq with photographs of the male and female genitalia.

Material and Methods

In this study, the specimens were obtained by manual collection under stones in the surroundings of Basrah, Iraq. Specimens were preserved in 70% ethanol. Examined specimens are deposited in the Niğde University Arachnology Museum (NUAM). Specimens were examined and illustrated using a SZ61 Oympus stereomicroscope. Somatic morphology measurements were taken using a scale reticule in the eyepiece of

the stereomicroscope. All measurements are in millimetres. The following abbreviations are used in the text: C: conductor, Fe: Femur.

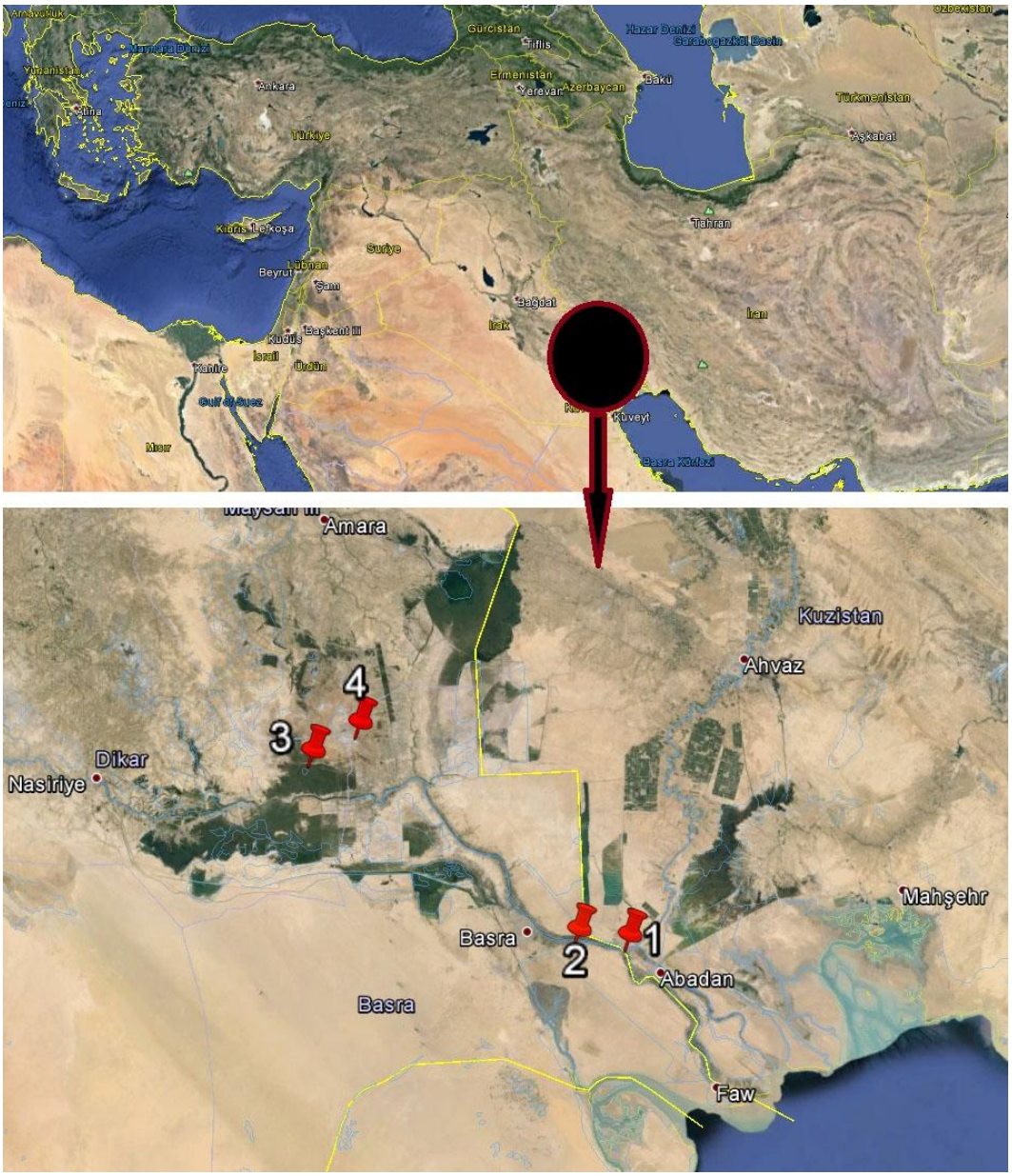


Fig. 1. Map of collecting localities of *Enoplognatha iraqi* sp. n. 1. Shat-Alarab, 2. Abu-Alkhaseeb, 3. Mdaina, 4. Al-Hwair.

Taxonomic treatment

Enoplognatha iraqi sp. n. (Figs. 2-4)

Type material: (1♂) Holotype male: Iraq, Basrah, Shat-Alarab (30º24'22.36"N 48º09'06.31"E, elevation 1m), 15 April 2013. Paratypes (1♂, 3♀♀) from same locality and date; 2♂, 2♀, Abu-Alkhaseeb (30º27'14.98"N 47º58'58.78"E, elevation 2m), 16 April 2013; 1♂, 1♀, Al-Mdaina (31º02'39.19"N 47º01'18.41"E, elevation 2m), 18 April 2013; 1♂, 1♀, Al-Hwair (31º07'04.83"N 47º13'41.08"E, elevation 3m), 20 April 2013.

Etymology: The specific name is an Arabic adjective referring to the country where it was found.
Diagnosis: The species is related to *E. diversa* and *E. macrochelis* and belongs to the diversa group. It is distinguished by the shape of cheliceral teeth, the bifid shape conductor, the distinctive extra tegular apophysis and the basally rounded triangular TTA (theridiid tegular apophysis) in male that is quite different than in *E. diversa* and *E. macrochelis*, the same for the TTA. The female is distinguished by the shape of the posteromedian depression in the epigyne. The pit of the epigyne seems also different than in *E. diversa* and *E. macrochelis*.
Description: Male (Fig. 2A): Total length 3.4–3.9; cephalothorax 1.46–1.50 long, 1.12–1.21 wide; Fe I 1.30–2.73 long. Female (Fig. 2B): Total length 3.2–5.2; cephalothorax 0.92– 1.82 long, 0.78–1.58 wide; Fe I 1.87–3.58 long. Colour: Prosoma yellowish brown, (female darker than male) with dark median and lateral stripes; sternum yellowish brown, in male with dark grey posteromedian spot, in female with bifurcate stripe; legs yellowish brown, distal part of segments and scattered spots darker; abdomen whitish with dorsal elongate dark grey to black folium, ventrally with dark grey median band, laterally flanked by two relatively wide whitish stripes. Male chelicerae with curved teeth, basally big and curved and upper small one (Fig. 4B). Male palp (Fig. 3A-B, 4A): tibia 0.24–0.26 long, cymbium 0.50–0.58 long; median apophysis large and basally rounded; theridiid tegular apophysis triangular, basally gently rounded and terminally wedge-shaped; extra tegular apophysis small and sharp, conductor large and terminally bifid; embolus short, forming half a circle. Epigyne (Fig. 3C): with small, posteromedian depression, 0.08–0.10 wide, with only its anterior margin chitinised. Vulvae (Fig. 3D): receptacula large and oval, connected by short and thick copulatory ducts.
Distribution (Fig. 1): Known only from the region of the type locality.
Ecology: Specimens were collected from September to April.



Fig. 2A-B. Habitus of *Enoplognatha iraqi* sp. n., dorsal view. A. Male. B. Female.

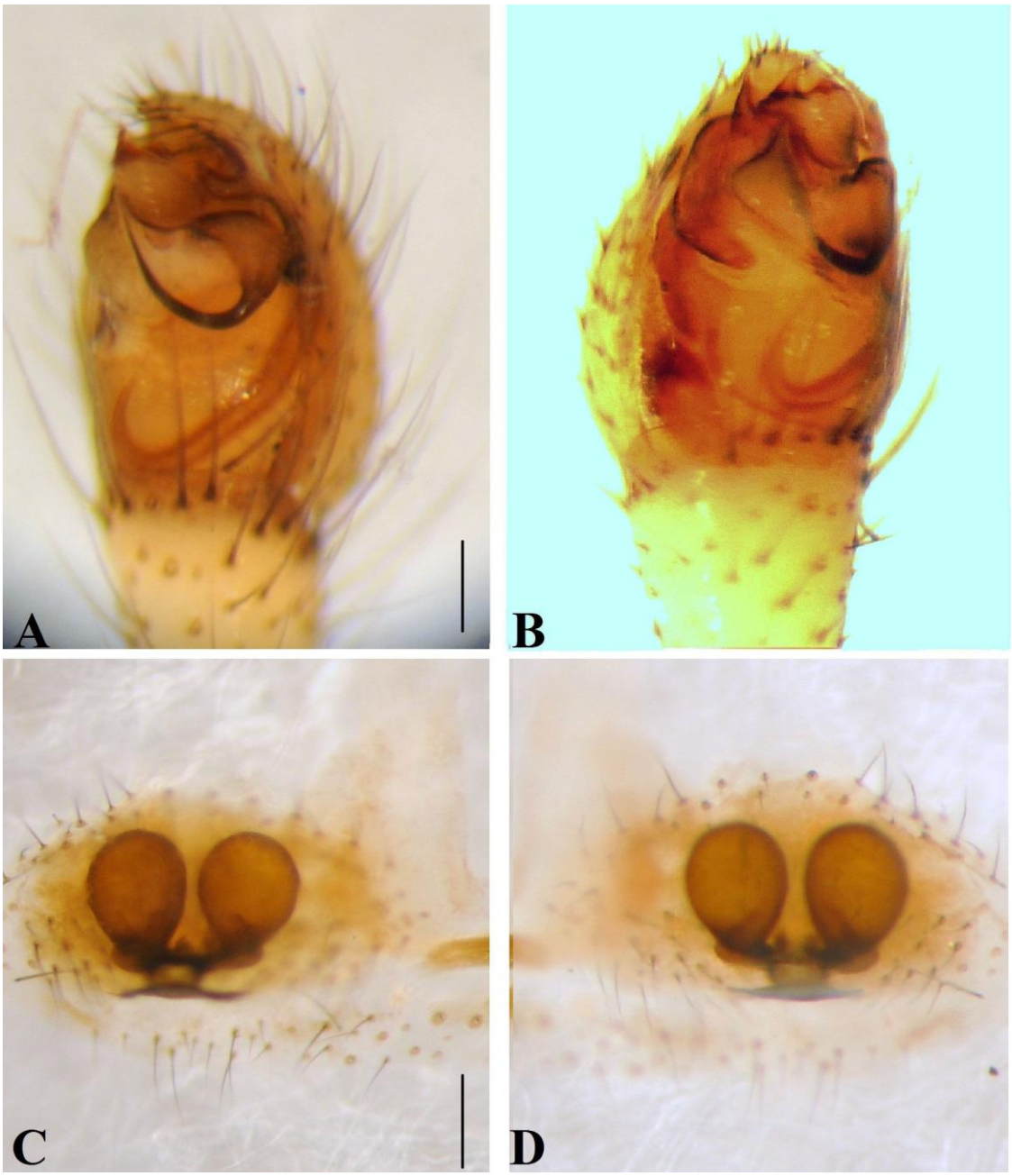


Fig. 3A-D. Genitalia of *Enoplognatha iraqi* sp. n. A-B. Male palp. A. Prolateral view. B. Ventral view. C-D. Female. C. Epigyne, ventral view. D. Vulvae, dorsal view. Scale line = 0.2 mm.

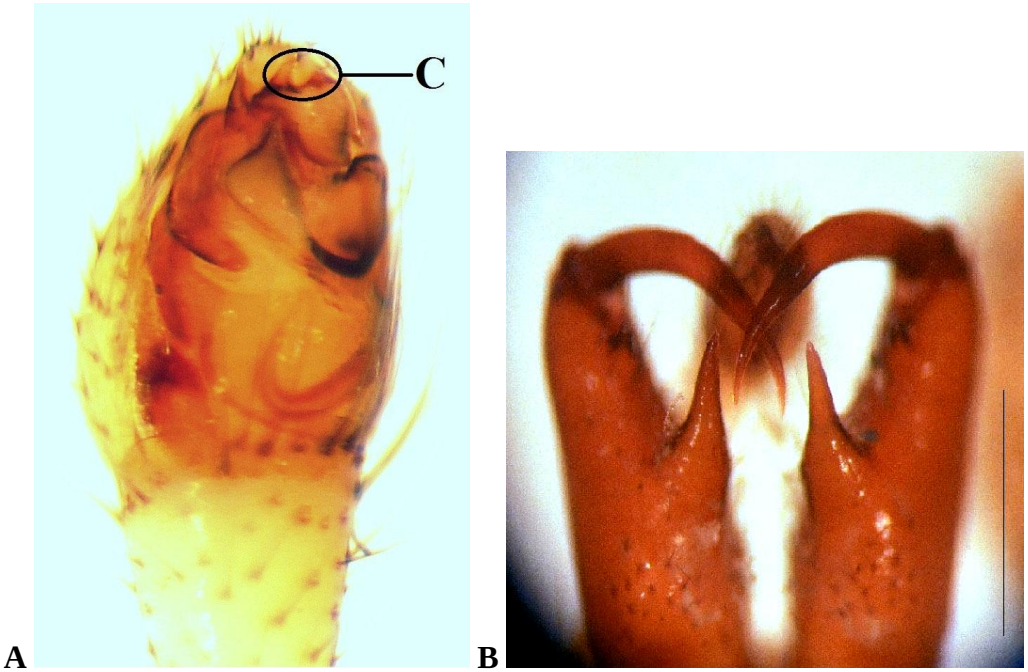


Fig. 4A-B. A. The shape of the bifid conductor of male palp. B. Male chelicerae, anterior view. Scale line = 0.5 mm.

Acknowledgments

We are most grateful to Dr. Johan Van Keer (Kapelle-op-den-Bos, Belgium) and other reviewers who reviewed the manuscript of this paper and their comments and advices helped us to improve our work and we apologize that we could not improve the illustrations more.

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Notes on the biology of *Latrodectus tredecimguttatus* (Rossi, 1790) (Araneae: Theridiidae)

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Abstract

This study was conducted to study the duration of *Latrodectus tredecimguttatus* (Rossi, 1790), Family Theridiidae. This species was found among and under stones on the ground in a mango orchard in Sadat City, El-Menoufiya Governorate, Egypt. Its life cycle was studied under laboratory conditions on different prey species at temperature of 27±2°C and relative humidity of 60-70%. One hundred and three spiderlings were reared each one alone. Males pass through four to five spiderling instars and females pass through eight ones before reaching adulthood with the life cycle averaged 107.83 days for males and 215.16 days for females. Obtained data showed that the first and second spiderling instars consumed the largest number of prey species Jassid, *Aphis* spp., and 1^{st}–3^{rd} instars of larvae of *Spodopetra littoralis*, while the third and fourth spiderling instars fed on the 1^{s}–3^{rd} instars of larvae of *S. littoralis* and larvae of *Galleria mellonella*. From fifth spiderling instars to adult, the individuals fed on different stages of larvae and adults of *S. littoralis* and larvae of *G. mellonella*. On the other hand, the adult spider males and females fed on the different stages of *S. littoralis* and *G. mellonella* during the lifespan. The life cycle and longevity periods of the spider lasted 107.83 & 75.17 and 215.16 & 87.45 days for male and female, respectively.

Keywords: Spiders, Theridiidae, *Latrodectus tredecimguttatus,* life cycle, rearing.

Introduction

Spiders are worldwide distributed and occupy many ecological environments through agro-ecosystems. Taxonomists recognized more than 45,700 species of 114 families (World Spider Catalog, 2015). Spiders are among the most abundant predatory groups in terrestrial ecosystems. They feed on insects and small arthropods, and they play

an important role in pest control. They attack most of pests infesting crops, vegetables, ornamental and orchard fruit trees (Sunderland, 1999). Recent trends in agriculture towards reduced pesticide use and ecological sustainability have lead to increased interest in spiders as potential biological control agents (Maloney *et al.*, 2003).

Genus *Latrodectus* Walckenaer, 1805 of the "Widow spiders" belongs to Family Theridiidae, the comb-foot spiders, and includes 31 world-wide described species (World Spider Catalog, 2015). They are notorious because of the extreme potency of their neurotoxic venom. They occur in warm and dry regions of all continents (Lotz, 1994; Levy, 1998). Three species of *Latrodectus* are recorded in Egypt: *L. geometricus* C.L. Koch, 1841, *L. pallidus* O. Pickard-Cambridge, 1872, and *L. tredecimguttatus* (Rossi, 1790) (El-Hennawy, 2002). In Egypt, El-Hennawy (2006) published his notes on the white widow *Latrodectus pallidus* in Jordan and Egypt and Mohafez (2015) studied the life cycle of *Latrodectus geometricus*.

Latrodectus tredecimguttatus is known from the Mediterranean region to China (World Spider Catalog, 2015). *L. tredecimguttatus* females' abdomen is globose and the legs are long and strong. The body and legs of this spider are black in colour and covered with small velvety hairs. The younger instars are ornate with 13 red or orange spots arranged in three longitudinal rows on the back of the abdomen. Sexual dimorphism and size dimorphism is obvious in *L. tredecimguttatus*, with the males being much smaller and more colourful, at variance to females, the red spots are generally apparent on the adult male's abdomen. *L. tredecimguttatus* "can bite humans, as also all other *Latrodectus* species in the world. Often, a bite causes significant effects, with severe and long-lasting pain in two-thirds of cases, preventing patients from sleeping in one-third of cases. Pain increases in more than half of the cases within the first hour and mostly radiates into the limbs or abdominal pain develops. Typical symptoms include sweating in about 70% of cases and further systemic effects in 20–30% of cases (nausea and vomiting in less than 20%, raised temperature and neuromuscular effects in about 10%, hypertension in less than 10% of cases). Pain usually lasts 1-2 days and the other symptoms 1–4 days" (Nentwig *et al*., 2015).

This work studies *L. tredecegmentattus* as predator of different stages of different kinds of prey, i.e. Jassids, Aphids, and the Egyptian cotton leaf worms which are the most dangerous pests on fruit trees, field crops and vegetable plants.

Material and Methods

An adult female of *Latrodectus tredecimguttatus* (Rossi, 1790) was collected by hand from Sadat City, El-Menoufiya Governorate, Egypt. It was found under a stone (Fig. 1) in a Mango orchard in September 2014. It was kept in a small plastic vial and transferred to the laboratory. We collected five other females (one of them collected with an egg sac) and one male (Fig. 2) during September-November 2014. The five females were kept in plastic vials of 10 cm diameter x 7 cm height and were supplied with prey and kept in an incubator at 27±1°C and 70-80% R.H. until eggs hatching.

The first female deposited 5 egg sacs during September 2014 - January 2015. Three sacs hatched yielding 512 spiderlings (the eggs of the last two sacs did not hatch). After emergence of hatched spiderlings from the egg sacs they were individually reared in plastic vials of 1.5 cm diameter x 4 cm height, each spiderling alone, under the same laboratory conditions. Each spiderling was supplied with a known number of adults of the Jassid *Amrasca biguttula*, Aphid *Aphis* spp. and 1^{st}-3^{rd} instars of larvae of the Egyptian cotton leaf worm *Spodopetra littoralis* as prey for the first and second instars, while the third and fourth instars were supplied with a known number of the 1^{st}-3^{rd} instars of larvae

S. littoralis and larvae of the greater wax moth or honeycomb moth *Galleria mellonella*. Then the 5th-8th instars and adults were supplied with a mixture of the larvae and adults of *S. littoralis*, and larvae of *G. mellonella*. The hatched spiderlings were reared until fourth instars and transferred to larger vials (3 cm diameter x 7 cm height). Adult females were transferred to larger vials (6 cm diameter x 11 cm height) and reared to observe their mating behaviour (Fig. 4) and to study other aspects of the life cycle of the species. Identification of the species was carried out by El-Hennawy (Cairo, Egypt) as *Latrodectus tredecimguttatus* (Rossi, 1790).

Results and Discussion

Egg-sac and incubation period

The egg-sac of *L. tredecimguttatus* (Fig. 5) is white or creamy in colour just formed, but usually turns yellowish in the few days while changed to dark before hatching. The egg sac is circular, slightly pyriform in shape and its most frequent size is about 8–10 mm in diameter. Shulov (1940) had slightly different egg sacs of *L. tredecimguttatus* in Palestine; "white globose sac 14-17 mm long and 12-15 mm wide, pointed on one side. On the outside it is covered with a smooth envelope, fine but tough, with the strength of parchment paper".

All spiderlings hatched and emerged from the egg sac through a small pore. The incubation period was 49 days under laboratory conditions, 27°C ±2 and 60-70% R.H. Nevertheless, in nature, the time spent within the cocoon may vary greatly, as the spiderlings may stay several months inside the cocoon over the winter (Shulov, 1940). After hatching, the 103 spiderlings were reared and most individuals died before adulthood. Only 54 individuals reached adult stage (23 males and 31 females) (Table 1).

Table 1. Duration of different stages of *Latrodectus tredecimguttatus* when fed on different kinds of prey.

Developmental stage	Prey	Duration (days)			
		Male		Female	
		Mean	S.D.	Mean	S.D.
Incubation period of eggs		49.00	0.00	49.00	0.00
1st spiderling instar	Jassid *Amrasca biguttula*, Aphid *Aphis* spp., and 1st – 3rd instar larvae of *Spodoptera littoralis*	9.83	1.64	11.55	1.52
2nd spiderling instar		13.30	1.96	12.84	2.88
3rd spiderling instar	1st – 3rd instar larvae of *Spodoptera littoralis* and larvae of *Galleria mellonella*	13.74	1.54	15.39	2.04
4th spiderling instar		15.30	2.01	17.65	2.42
5th spiderling instar	Larvae and adults of *Spodoptera littoralis* and larvae of *Galleria mellonella*	17.00	1.73	21.84	2.07
6th spiderling instar		---	---	25.42	1.89
7th spiderling instar		---	---	29.71	2.10
8th spiderling instar		---	---	31.77	2.20
Total instars		58.83	6.79	166.16	5.52
Life cycle		107.83	6.79	215.16	5.52
Longevity		75.17	9.19	87.45	10.85
Life span		180.00	9.34	302.61	12.61

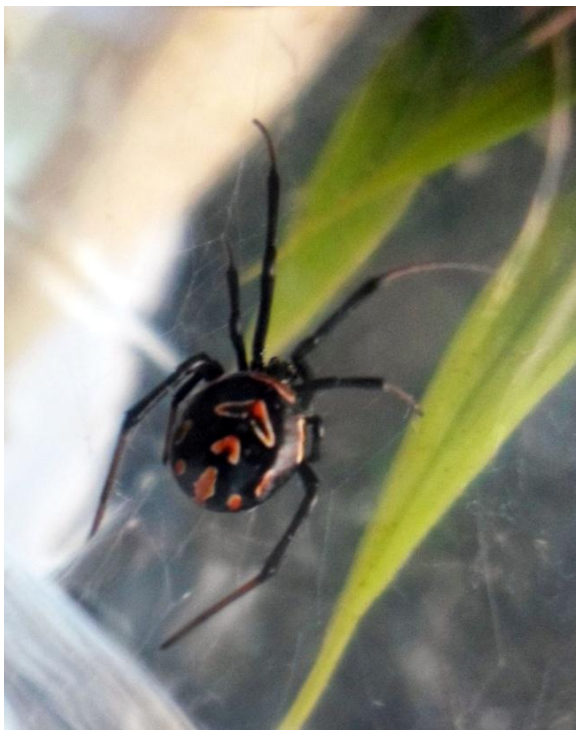
1



2



3



Figs. 1-3. *Latrodectus tredecimguttatus*. 1. Female in her nest under a stone beside the carcasses of her preys. 2. Adult male. 3. Juvenile.

The life cycle

During rearing the 103 spiderlings of *L. tredecimguttatus*, 49 individuals died before reaching adult stage and 54 individuals reached adult stage. The spiderlings passed through 4-5 instars for males and 8 instars for females during their development (Table 1). The 54 adults were 23 males (42.59%) and 31 females (57.41%). The 23 adults males were 14 of them became adult males after four moults, and 9 became adult males after five moults, while the 31 individuals of female became adult after eight moultings. The longest duration was the 5th instar and 8th instar with value (17.00–31.77) days for male and female respectively. The shortest instar was the first instar with value (9.83-11.55) day for both male and female (Table 1). Lifespan also differed according to sex. Generally, adult female of *L. tredecimguttatus* lived longer than male (Table 1).

Table 2. Daily rate of food consumption by *Latrodectus tredecimguttatus* in laboratory when fed on three different prey species at 25°C.

Developmental stage	Prey	Male				Female			
		Daily rate				Daily rate			
		Range		Mean	S.D.	Range		Mean	S.D.
1st instar	*Amrasca biguttula* & *Aphis* spp.	8	12	8.86	0.81	7	10	8.7	0.93
2nd instar		8	13	8.6	1.59	8	12	10.14	1.20
3rd instar	*Galleria mellonella* & *Spodoptera littoralis*	8	10	8.31	1.71	8	11	9.20	0.88
4th instar		7	9	8.04	0.71	8	11	9.73	0.86
5th instar		7	10	8.50	1.04	6	9	7.23	0.92
6th instar		--	--	--	--	6	9	7.85	1.10
7th instar		--	--	--	--	5	8	6.55	0.85
8th instar		--	--	--	--	6	9	5.81	0.76

Food consumption

Spiderlings and adults only fed on different live and mobile prey species, hunting them actively. They fed on jassids larvae, adults and all moveable stages of *Aphis* spp. The first instar spiderlings fed on larvae and adults of jassids. While the 2nd instar fed on larvae and adults of aphids. From third to all immature spiderlings fed on different stages of *S. littoralis*. All adult male and female spiders fed on the adult *Galleria* and adults of *S. littoralis* and larvae of *G. mellonella* (Table 2).

The adult or the immature of the spider *L. tredecimguttatus* came slowly near to the prey and moved around it for a few seconds, then caught it between its chelicerae and used its mouthparts in sucking the prey contents leaving only the wings, after 2-3 minutes of external digestion. The results of food consumption in table (3) agree with Mohafez (2015) who studied the life cycle of *Latrodectus geometricus*.



Fig. 4. Mating of a male (above) and female of *Latrodectus tredecimguttatus* in laboratory.



Fig. 5. Female of *Latrodectus tredecimguttatus* with her egg sacs.

Table 3. Daily rate of food consumption by *Latrodectus tredecimguttatus* in laboratory when fed on *Spodoptera littoralis*.

Developmental stage	Prey	Male				Female			
		Daily rate				Daily rate			
		Range		Mean	S.D.	Range		Mean	S.D.
1st instar	1st – 3rd instar larvae of *Spodoptera littoralis*	3	4	3.5	0.71	3	5	4	1.41
2nd instar		3	5	4	1.41	3	6	4.5	2.12
3rd instar		4	6	5	1.41	4	7	5.5	2.12
4th instar		4	7	5.5	2.12	6	9	7.5	2.12
5th instar	different stages larvae and adult *Spodoptera littoralis*	2	3	2.5	0.71	3	4	3.5	0.71
6th instar		--	--	--	--	3	4	3.5	0.71
7th instar		--	--	--	--	3	4	3.5	0.71
8th instar		--	--	--	--	4	5	4.5	0.71

Acknowledgment

We would like to thank Mr. Hisham K. El-Hennawy (Cairo) for his great help in this work and identified the studied spider species and kindly revised a draft of the manuscript of this paper.

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The first record of *Trachelas minor* (O. Pickard-Cambridge, 1872) (Araneae: Trachelidae) in Egypt

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Abstract

Trachelas minor O. Pickard-Cambridge, 1872 is recorded from Egypt for the first time. It is the first record of both the species and genus *Trachelas* L. Koch, 1872, in addition to Family Trachelidae Simon, 1897, in Egypt.

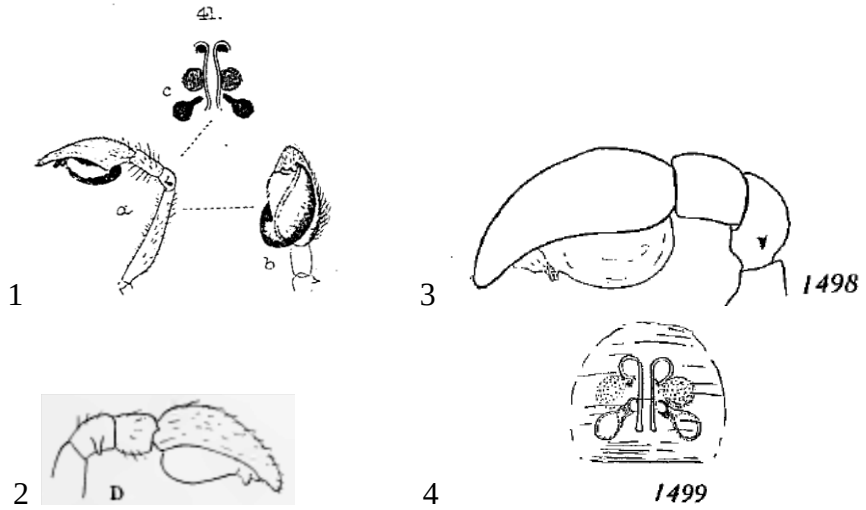
Keywords: Spiders, Trachelidae, *Trachelas minor*, Egypt.

Introduction

Although I have examined several males and females of *Trachelas minor* O. Pickard-Cambridge, 1872 from Egypt many years ago, the publication of the record of this species in Egypt is unintentionally delayed for a long time. *T. minor* is known since 1872 from the Middle East and it is distributed from the Mediterranean region to Central Asia, and West Africa (World spider Catalog, 2015). This record is expected and its importance is local. It adds a new species, genus, and family to the Egyptian spider fauna (El-Hennawy, 2006).

Among the extant 114 spider families, Family Trachelidae Simon, 1897 includes 16 genera and 208 species (World spider Catalog, 2015). Trachelidae is elevated to family status and relimited by Ramírez (2014). Genus *Trachelas* L. Koch 1872, its type genus, includes 86 species. Most *Trachelas* species are recorded from Central and South America, then Asia & Africa; a few species in Europe, and one species, the type species *Trachelas minor*, is Mediterranean to Central Asia (World spider Catalog, 2015).

Octavius Pickard-Cambridge (1872) described a single adult female of *Trachelas minor* found under a stone in Jericho, Palestine as a new species of family Drassides (now Gnaphosidae) [♀ epigynum, pl. 16, f. 41c]. He did not describe the male, but he received and published the drawings of the palp of a male from France drawn by L. Koch who was the author of the name of genus *Trachelas* (Fig. 1), the name that was mentioned without any description in L. Koch's "*Die Arachniden-Familie der Drassiden*" (1866) and became available after the description of the type species in 1872.



Figs. 1-4. *Trachelas minor* O. Pickard-Cambridge, 1872 1. Male palp: 1a-b, 2-3. Female epigynum: 1c, 4. [1a-b. by L. Koch in Pickard-Cambridge, 1872. 1c after Pickard-Cambridge, 1872. 2-4. after Simon, 1897 (2), 1932 (3-4).]

Simon (1878) redescribed the female and the male of *Trachelas minor* from France and Corsica in addition to its record from Syria (= Palestine). He discussed the genus and its 5 species groups under Family Clubionidae, Subfamily Corinninae, Group Tracheleae from: "Regio mediterr.; Africa trop, orient., occid. et austr.; ins. Madagascar; India orient.; Malaisia; Amer, sept., centr., merid. et antillana" (pp.184-185) (Simon, 1897) [with f. 178D: ♂ palp (Fig. 2)]. He published again the descriptions of both the male and the female of *T. minor* with the figures of their genitalia in his book "*Les arachnides de France. Tome VI.*" (Simon, 1932) [with ♂ palp (f. 1498) and ♀ epigynum (f. 1499)] (Figs. 3-4).

Bosselaers *et al*. (2009) described male and female in detail with fine illustrations in their work on the Mediterranean species of Trachelinae with a revision of genus *Trachelas* on the Iberian Peninsula. Their data expanded the species' range towards the East coast of Spain in addition to Portugal, France, Greece, and Algeria.

Kovblyuk & Nadolny (2009) re-described *Trachelas minor* and recorded it for the first time from Crimea and Ukraine, and for Ingushetia (Russia) and Abkhazia. The distribution of the species became: West Africa and the Ancient Mediterranean region - from Spain to Uzbekistan: Sierra-Leone, Liberia, Algeria, Spain, France, Italy, Greece, Syria [= Palestine], Krasnodar Area of Russia, Azerbaijan, Turkmenistan, Uzbekistan; Crimea (Ukraine), Abkhazia and Ingushetia (Russia).

Marusik & Kovblyuk (2010) described *Trachelas minor* and the two other species of the same genus known in Russia with fine illustrations.

Danışman *et al.* (2010) redescribed *Trachelas minor* and recorded it for the first time from Antalya south west Turkey.

Wunderlich (2012) presented an identification key to the European genera of the spider Family Corinnidae including 11 European genera and discussed the relationships of the family and of some genera. *T. minor*, genus *Trachelas*, and Subfamily Trachelinae were dealt with in his work.

Trachelidae Simon, 1897 is elevated to family status and relimited by Ramírez (2014) in accordance with Deeleman-Reinhold (2001). Genus *Trachelas* is recently restored to Corinnidae again by Murphy & Roberts (2015), but not yet accepted by the World Spider Catalog.

Trachelas minor O. Pickard-Cambridge, 1872
(Figs. 1-10)

Trachelas minor O. P.-Cambridge, 1872: 256-257, pl. 16, f. 41a-c (D♀, figured ♂).
Trachelas minor Simon, 1878: 283-284 (D♂♀).
Trachelas minor Simon, 1897: 184, f. 178 (p.179) (♂).
Trachelas minor Simon, 1932: 957-958, 977, f. 1498-1499 (♂♀).
Trachelas minor Bosselaers *et al.*, 2009: 18-22, f. 4, 9-15 (♂♀).
Trachelas minor Kovblyuk & Nadolny, 2009: 37, f. 1-36 (♂♀).
Trachelas minor Marusik & Kovblyuk, 2010: 26, f. 4-5, 13-22 (♂♀).
Trachelas minor Danışman *et al.*, 2010: 10-12, f. 2A-E, 3A-E (♂♀).
Trachelas minor Wunderlich, 2012: 21, f. 15-16 (♂♀).
Trachelas minor Ramírez, 2014: 50, 75, 140, 143, 159, 204, 205, 207, 239, 247, 269, 272, 331, 373, f. 72D (p.104), f. 140G (p.212), 167C (p.252), 179D (p.264), 225 (p.332), 227 (p.334) (♂♀).


5


6


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8


9



Figs. 5-10. *Trachelas minor* O. Pickard-Cambridge, 1872 [El-Beheira Governorate]. 5-6. Habitus, dorsal view. 5. Male. 6. Female. 7-9. Male pedipalp. 7. prolateral view. 8. ventral view. 9. retrolateral view. 10. Female ventral view showing epigynum.

Material examined: 1♂ 21.12.2013, 1♀ 13.4.2013, Egypt, El-Beheira Governorate, Badr district, citrus grove (about 30°36'47"N, 30°37'41"E, elevation 19m), leg. Ibrahim Zaher; 1♂1♀ 11.2.2014, Egypt, El-Menoufiya Governorate, El-Sadat City, Apple orchard (about 30°25'05"N, 30°34'27"E, elevation 33m), leg. Gihan Sallam.

Description. See: O. Pickard-Cambridge (1872), Bosselaers *et al.* (2009), etc.
Habitus, male (Fig. 5) and female (Figs. 6, 10).
Male pedipalp (Figs. 7-9). Female epigynum (Fig. 10).

Measurements:

Governorate		TL	AL	CL	CW
El-Beheira	♂	2	1.02	1.04	0.94
	♀	2.3	1.38	1	0.88
El-Menoufiya	♂	1.8	1.12	CL 0.94	0.84
	♀	2	1.2	0.8	0.86

Abbreviations used: AL = Abdomen length, CL = cephalothorax length; CW = cephalothorax width; TL = total length. All measurements were taken in millimetres.

Distribution. This species is recorded from Mediterranean to Central Asia, West Africa (World spider Catalog, 2015). It was recorded from : Sierra-Leone, Liberia, Algeria, Portugal, Spain, France, Corsica, Italy, Greece, Turkey, Palestine, Russia, Ukraine, Azerbaijan, Turkmenistan, and Uzbekistan (O. Pickard-Cambridge, 1872; Simon, 1878; Bosselaers *et al.*, 2009; Kovblyuk & Nadolny, 2009; Marusik & Kovblyuk, 2010; Danışman *et al.*, 2010; and Ramírez, 2014). Its record from Egypt is within the range of its known geographical distribution.

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I am grateful to Dr. Gihan M.E. Sallam (Plant Protection Research Institute, Giza) and Mr. Ibrahim A.I. Zaher (Faculty of Agriculture, Al-Azhar University, Cairo) who put their *Trachelas* specimens at my disposition for this study.

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New localities of cobweb spiders (Araneae: Theridiidae) in West Anatolia, Turkey

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Abstract

A list of 16 species of Family Theridiidae collected at 27 localities in west Anatolia, Turkey is presented. New localities of the spider fauna of Turkey have been done for the following five species: *Enoplognatha afrodite* Hippa & Oksala, 1983; *Euryopis episinoides* (Walckenaer, 1847); *Heterotheridion nigrovariegatum* (Simon, 1873); *Theridion adrianopoli* Drensky, 1915; *Theridion pinastri* L. Koch, 1872**.**

Keywords: Araneae, Theridiidae, West Anatolia, Turkey.

Introduction

Recent works on the spider fauna of west Anatolia were published by Bayram *et al.* (2000), Kaya & Uğurtaş (2008, 2011), Uyar *et al.* (2010), Uyar & Uğurtaş (2012), and Yılmaz *et al.* (2009). Bayram *et al.* (2000) recorded 41 species belonging to 31 genera and 12 families in the western part of Turkey. Numerically, Lycosidae was the dominant family. In Kaya & Uğurtaş (2008), 17 species of family Araneidae were recorded on the Uludağ Mountain, Bursa. Uyar *et al.* (2010) presented Philodromid spiders' fauna of Uludağ Mountain with an annotated checklist of the Philodromidae of Turkey. Uyar & Uğurtaş (2012) recorded 13 species in 10 genera of jumping spiders in the Northwest Anatolia and new records for spider fauna of Turkey have been done. Yılmaz *et al.* (2009) recorded 15 species in 8 genera of the crab spiders (Thomisidae) from Uludağ Mountain.

Family Theridiidae is among the most species-rich families of spiders in Turkey. Recent works on the spider fauna of west Anatolia were published by Bayram *et al.* (2014). Seven genera and species of theridiid spiders are reported from Turkey for the first time by Marusik & Kunt (2010).

According to the checklist of Topçu *et al*. (2005), the Turkish theridiid fauna included 31 species. Nowadays in Turkey, a total of 79 species of 31 genera of Theridiidae are known (Bayram *et al.*, 2014). Only one theridiid species, *Robertus brachati* Wunderlich, 2011, is endemic in Southern Turkey (Anatolia) (Wunderlich, 2011).

Material and Methods

Turkey consists of two general parts, Thrace and Anatolia. Thrace is the European section of Turkey, which forms the borders of Turkey with Greece and Bulgaria. Anatolia is the Asian part of Turkey, which also forms the borders with Georgia, Armenia, Iran, Iraq, and Syria. Turkey is geographically divided into Marmara, Aegean, Black Sea, Central Anatolia, Eastern Anatolia, South-eastern Anatolia, and Mediterranean regions.

In this work, theridiid spiders' material was collected during the field seasons of 2006-2011 from 27 localities in Aydın, Balıkesir, Bursa and Manisa (Fig. 1). Hand collecting, sweeping net and tree/branch shaking were used for collecting spiders.

The keys of Roberts (1995), Heimer & Nentwig (1991), and Nentwig *et al*. (2015) were used for species identification. The geography of species is given by: Levy & Amitai (1982), Brignoli (1984), Deltshev (1992), Wunderlich (1995), Knoflach (1997), Marusik *et al*. (2009), Marusik & Kunt (2010), Le Peru (2011), and Platnick (2014).

The material studied is deposited in the collection of Department of Biology, Zoology Museum, Uludağ University, Bursa, Turkey. Localities, coordinates and altitudes in west Anatolia are listed in Table (1). Data on 16 species of Theridiidae, including new faunistic records are here presented.



Fig. 1. The survey areas in West Anatolia region: Aydın, Balıkesir, Bursa, Manisa and new localities and new records of *Enoplognatha afrodite* (1), *Euryopis episinoides* (2), *Heterotheridion nigrovariegatum* (3), *Theridion adrianopoli* (4), *Theridion pinastri* (5).

Table 1. List of localities, their coordinates and altitudes where the spiders have been collected in the study area.

No.	Localities	Coordinates	Altitudes
1	Akıncılar village, Inegöl town, Bursa province	40°06'45"N, 29°23'28"E	436 m
2	Altınkum area, Didim town, Aydın province	37°21'08"N, 27°17'35"E	8 m
3	Aşağıdanışment village, Savaştepe town, Balıkesir province	39°22'34"N, 27°42'51"E	530 m
4	Çöreler village, Orhaneli town, Bursa province	39°56'45"N, 28°57'00"E	400 m
5	Around the Dingiller village, Akhisar town, Manisa province	39°00'06"N, 27°52'22"E	141 m
6	Erenler village, Orhaneli town, Bursa province	40°02'N, 28°54'E	599 m
7	Ertuğrulkent, Nilüfer town, Bursa province	40°13'19"N, 28°54'47"E	69 m
8	Gördes village road, Akhisar town, Manisa province	38°59'45"N, 27°58'19"E	681 m
9	Görecek plateau, Büyükorhan town, Bursa province	39°46'26"N, 28°50'51"E	1059 m
10	Hüseyinalan village, Osmangazi town, Bursa province	40°07'09"N, 29°01'03"E	993 m
11	Karaıslah village, Osmangazi town, Bursa province	40°01'11"N, 29°07'51"E	843 m
12	Keles-Dedeler village road, Uludağ mountain, Keles town, Bursa province	39°55'44"N, 29°06'49"E	983 m
13	Mesruriye village, İnegöl town, Bursa province	39°55'18"N, 29°37'10"E	858 m
14	Kabaklar village, Orhaneli town, Bursa province	39°54'08"N, 29°04'51"E	626 m
15	Kirazlıyayla, Uludağ Mountain, Bursa province	40°06'50"N, 29°05'25"E	1.522 m
16	Around the Orhaneli town, Bursa province	39°54'30"N, 28°59'15"E	489 m
17	Osmaniye town, Kestel town, Bursa province	40°08'55"N, 29°15'24"E	619 m
18	Ova area, Aşağıdanışment village, Savaştepe town, Balıkesir province	39°21'52"N, 27°41'09"E	439 m
19	Patricia Penunsula, Ayvalık town, Bursa province	39°22'22"N, 26°27'19"E	7 m
20	Sadağı Canyon, Orhaneli town, Bursa province	39°52'96"N, 28°55'49"E	443 m
21	Şeytan Sofrası road, Ayvalık town, Balıkesir province	39°17'09"N, 26°38'31"E	89 m
22	Araound the Tahtaköprü, İnegöl town, Bursa province	39°56'41"N, 29°39'01"E	611 m
23	Turgutalp village, Inegöl town, Bursa province	40°02'54"N, 29°23'12"E	650 m
24	Tuzaklı village, Uludağ Mountain, Bursa province	40°06'24"N, 29°00'07"E	704 m
25	Uludağ University campus, Bursa province	40°13'N, 28°51'E	107 m
26	Uludağ Mountain, Bursa province	Un-precise locality	
27	Yenice village, Inegöl town, Bursa province	40°05'21"N, 29°25'22"E	361 m

Results

Asagena phalerata (Panzer, 1801)
Material: **'**Bursa province: Around the Orhaneli' 1♀, 13.VII.2006. Collected on the ground from *Pinus nigra* forest.
World distribution: Palaearctic.

Crustulina scabripes Simon, 1881
Material: 'Bursa province: Sadağı canyon, Orhaneli' 1♀, 1♂, 2.VI.2008; 'Balıkesir province: Şeytan sofrası road, Ayvalık' 1♀, 20.V.2010.
World distribution: Mediterranean.

Enoplognatha afrodite Hippa & Oksala, 1983
Material: 'Bursa province: Sadağı canyon, Orhaneli' 1♀, 2.VI.2008; Uludağ Mountain' 1♀, 2008.
World distribution: Southern Europe.

Enoplognatha latimana Hippa & Oksala, 1982
Material: 'Bursa province: Karaıslah village,' 1♀, 18.VII.2006; Kirazlıyayla, Uludağ Mountain' 1♀, 6.VII.2008; 1♀, 29.VII.2008.
World distribution: Holarctic. Almost all Europe, except in the North.

Enoplognatha ovata (Clerck, 1757)
Material: 'Bursa province: Around the Erenler village, Orhaneli' 1♀, 13.VII.2006; Yenice village, Inegöl' 1♀, 16.VII.2006; Akıncılar village, Inegöl' 1♀, 16.VII.2006; Hüseyinalan village, Osmangazi' 1♀, 27.VI.2007; Tuzaklı village, Uludağ Mountain' 1♀, 27.VI.2007; Mesruriye village, Inegöl' 1♀, 2.VII.2007; Around the Kozluören village, Inegöl' 1♀, 16.VII.2007; Kabaklar village, Orhaneli' 1♀, 31.VII.2007;Turgutalp village, Inegöl' 1♀, 13.VII.2008; 'Balıkesir province: Ova area, Aşağıdanışment, Savaştepe' 1♀, 01.VI.2010; Aşağıdanışment village, Savaştepe' 1♀, 2.VII.2010.
World distribution: Holarctic**.** All Europe, except in the far North.

Euryopis episinoides (Walckenaer, 1847)
Material: 'Aydın province: Altınkum area, Didim' 4♂♂, 17.VI.2011. Collected on the ground.
World distribution: Mediterranean (Canary Islands to Israel, North to the Czech Republic), China.

Heterotheridion nigrovariegatum (Simon, 1873)
Material: 'Bursa province: Tuzaklı village, Uludağ Mountain' 1♂, 27.VI.2007; Gözede village, Kestel' 1♀, 8.VII.2007**.**
World distribution: Palaearctic. In Europe: Austria, Bulgaria, Corsica, Croatia, Czech Republic, France, Germany, Greece, Hungary, Italy, Macedonia, Poland, Romania, Sicily, Slovakia, Spain, Switzerland and Ukraine.

Parasteatoda lunata (Clerck, 1757)
Material: 'Bursa province: Sadağı canyon, Orhaneli' 2♀♀, 2.VI.2008.
World distribution: Palaearctic.

Phylloneta impressa (L. Koch, 1881)
Material: 'Bursa province: Around the Tahtaköprü, Inegöl' 1♀, 1♂, 2.VII.2007; Kirazlıyayla, Uludağ Mountain' 1♂, 6.VII.2008; 1♀, 1♂, 29.VII. 2008. Collected from *Cirsium* sp.
World distribution: Holarctic.

Platnickina tincta (Walckenaer, 1802)
Material: 'Bursa province: Tuzaklı village, Uludağ Mountain' 1♀, 27.VI.2007.
World distribution: Holarctic.

Steatoda paykulliana (Walckenaer, 1805)
Material: Balıkesir province: Aşağıdanışment village; Savaştepe' 2♀♀, 15.V.2011. Patricia peninsula, Ayvalık'1♀, 20.V.2010; Bursa province: Keles-Dedeler village road

3♂♂, 8.III.2007; ‘Görecek plateau, Büyükorhan’ 1♀, 1♂, 9.V.2011. ‘Manisa province: Dingiller village, Akhisar 3♀♀, 23.IV.2011.
World distribution: Europe, Mediterranean to Central Asia.

Steatoda triangulosa (Walckenaer, 1802)
Material: ‘Bursa province: Uludağ University campus’ 1♂, 18.VI.2010; ‘Balıkesir province: Aşağıdanışment village, Savaştepe’ 1♀, 29.VI.2010; ‘Bursa province: Uludağ Mountain’ 1♀, 2010; ‘Manisa province: Gördes road, Akhisar’ 1♀, 24.VII.2010; ‘Bursa province: Ertuğrulkent, Nilüfer’ 1♀, 10.VIII.2011.
World distribution: Cosmopolitan. In Europe, almost everywhere except in the North.

Theridion adrianopoli Drensky, 1915
Material: ‘Bursa province: Keles-Dedeler road, Keles’ 2♂♂, 8.III.2007.
World distribution: Macedonia, Bulgaria, Greece, Crete, Turkey.

Theridion melanurum Hahn, 1831
Material: ‘Bursa province: Sadağı canyon, Orhaneli’ 1♀, 2.VI.2008.
World distribution: Holarctic, Azores. Almost everywhere in Europe, except in the north.

Theridion pinastri L. Koch, 1872
Material: ‘Bursa province: Mesruriye, Inegöl’ 1♂, 2.VII.2007.
World distribution: Palaearctic. Almost all Europe, except in the north and the Mediterranean islands.

Theridion varians Hahn, 1833
Material: ‘Bursa province: Saitabat village, Kestel’ 1♀, 8.VII.2007; Osmaniye village, Kestel’ 1♀, 8.VII.2007; Çöreler village, Orhaneli’ 1♀, 31.VII.2007.
World distribution: Holarctic. Almost all Europe, except in the North.

Discussion

According to this study, theridiid spiders of Turkey have five distribution patterns: Cosmopolitan, Holarctic, Palaearctic, Mediterranean, and East Mediterranean-Balkans. Holarctic species are the largest number.

Cosmopolitan: *Steatoda triangulosa* (Walckenaer, 1802).

Holarctic: *Enoplognatha latimana* Hippa & Oksala, 1982, *Enoplognatha ovata* (Clerck, 1757), *Phylloneta impressa* (L. Koch, 1881), *Platnickina tincta* (Walckenaer, 1802), *Theridion melanurum* Hahn, 1831 and *Theridion varians* Hahn, 1833.

Palaearctic: *Asagena phalerata* (Panzer, 1801), *Heterotheridion nigrovariegatum* (Simon, 1873), *Parasteatoda lunata* (Clerck, 1757) and *Theridion pinastri* L. Koch, 1872.

Mediterranean: *Crustulina scabripes* Simon, 1881, *Euryopis episinoides* (Walckenaer, 1847), and *Steatoda paykulliana* (Walckenaer, 1805).

East Mediterranean-Balkans: *Enoplognatha afrodite* Hippa & Oksala, 1983, and *Theridion adrianopoli* Drensky, 1915.

Crustulina scabripes was collected from low altitudes from Marmara Region (Anatolia part) in Turkey. In addition, the species has been known from Mediterranean, Azerbaijan and Turkey so it is likely more widely spread to the east.

Enoplognatha afrodite was recorded from Aegean region in Turkey (Topçu *et al*., 2005). In this study, we add a new locality to the distribution range of the species in

Sadağı canyon and Uludağ Mountain (Bursa) from Marmara region (Anatolia) so it can be found in other Asian countries. It is rarely found in southern Europe (Nentwig *et al.*, 2015).

Euryopis episinoides was reported from Antalya province, Sirek District, a tomato glasshouse for the first time by Marusik *et al*. (2009). We add a new Turkish locality in Aydın province, Altınkum area, Didim from Aegean region (Anatolia).

Theridion adrianopoli was first described by the female from the type locality Edirne (Marmara region, European Turkey) (Knoflach, 1997; Topçu *et al*., 2005). We identified two males from Keles-Dedeler road, Keles, Bursa (Marmara region, Asian part of Turkey) and this is a new locality for Turkey. It was collected in March and our specimens are the first adult males recorded in Turkey. *T. adrianopoli* is a widespread and common species in the south-eastern Mediterranean, inhabiting sparse woodland (Knoflach, 1997). In addition, it is known from the Aegean Islands, Bulgaria, Crete, Croatia, Greece, Macedonia, and Turkey, so almost all Balkan and Middle East countries.

Theridion pinastri was recorded from Artvin province (41°15.642'N, 41°46.365'E, 225 m) by Marusik *et al*. (2009). We add a new locality to the distribution range of species in Bursa province, Mesruriye, Inegöl (Marmara region-Anatolia).

The most species rich theridiid genera in Turkey were *Enoplognatha*, but in this study, the most common genera and species were *Theridion and Enoplognatha ovata*.

Heterotheridion nigrovariegatum has been recorded for the first time in Turkey by Turkeş & Mergen (2007). We add a new locality to its distribution range depending on one female and one male specimens found in Bursa province.

Parasteatoda lunata, *Steatoda albomaculata*, *S. bipunctata*, and *S. grossa* were recorded by Kaya & Uğurtaş (2011) from Uludağ Mountain, but they were not present in our material from the same area, while we found more other species: *Crustulina scabripes*, *Enoplognatha afrodite*, *Heterotheridion nigrovariegatum*, *Platnickina tincta*, *Theridion adrianopoli*, and *T. pinastri*.

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